Call-A.P.P.L.E.™

Volume 8, Number 6
June 1985

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Spreadsheets at School

INSIDE:

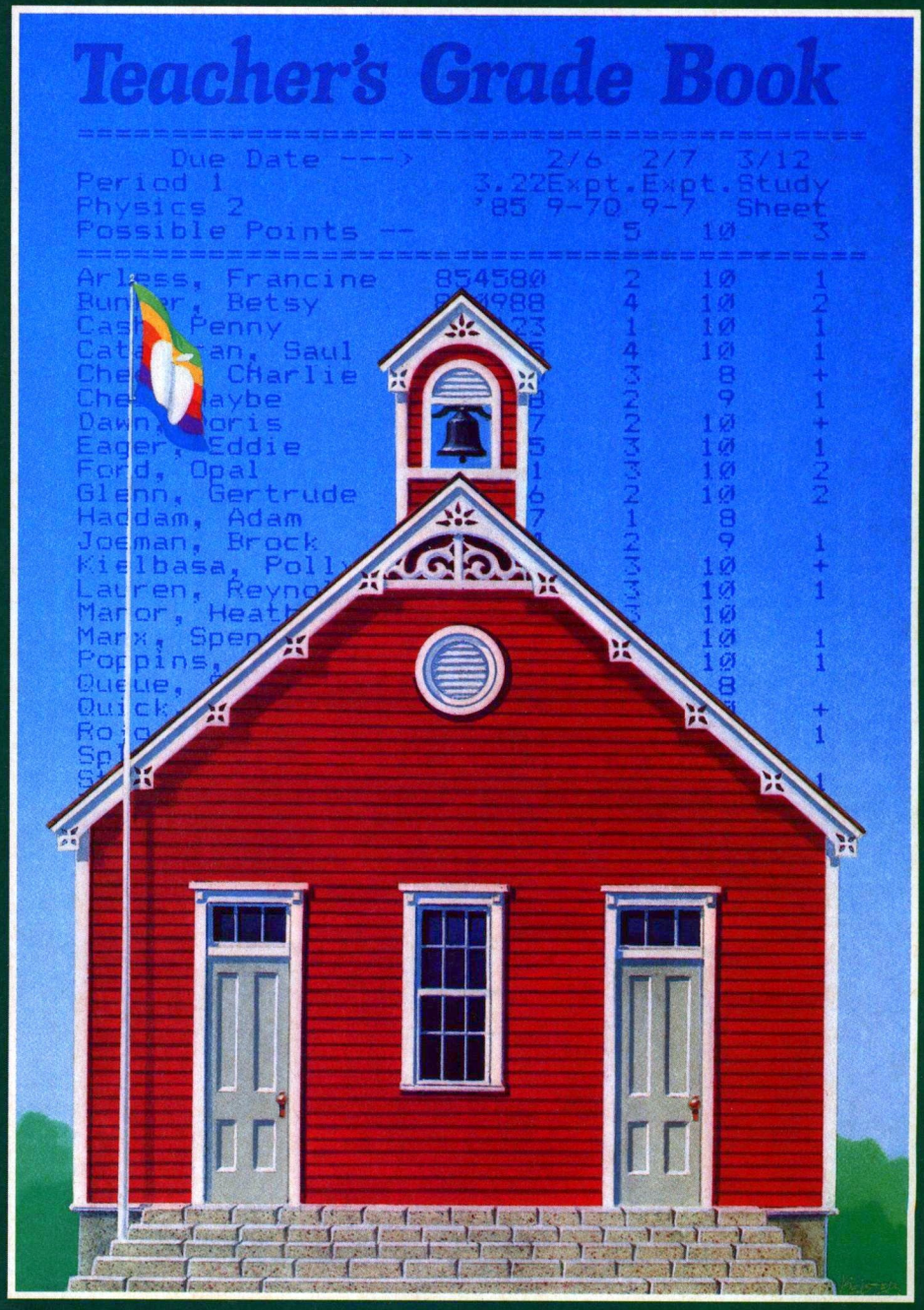
- Using AppleWorks in the Classroom
- Implementing Screen Graphic Animation
- A ProDOS CHAIN Bug

MACINTOSH SECTION:

- Modula-2 on the Mac
- Poor Man's Mac-Apple II Peripheral Network
- Whither Lisa/ Mac XL?

PLUS:

- The Great A.P.E. Contest
- New Products
- and more. . .



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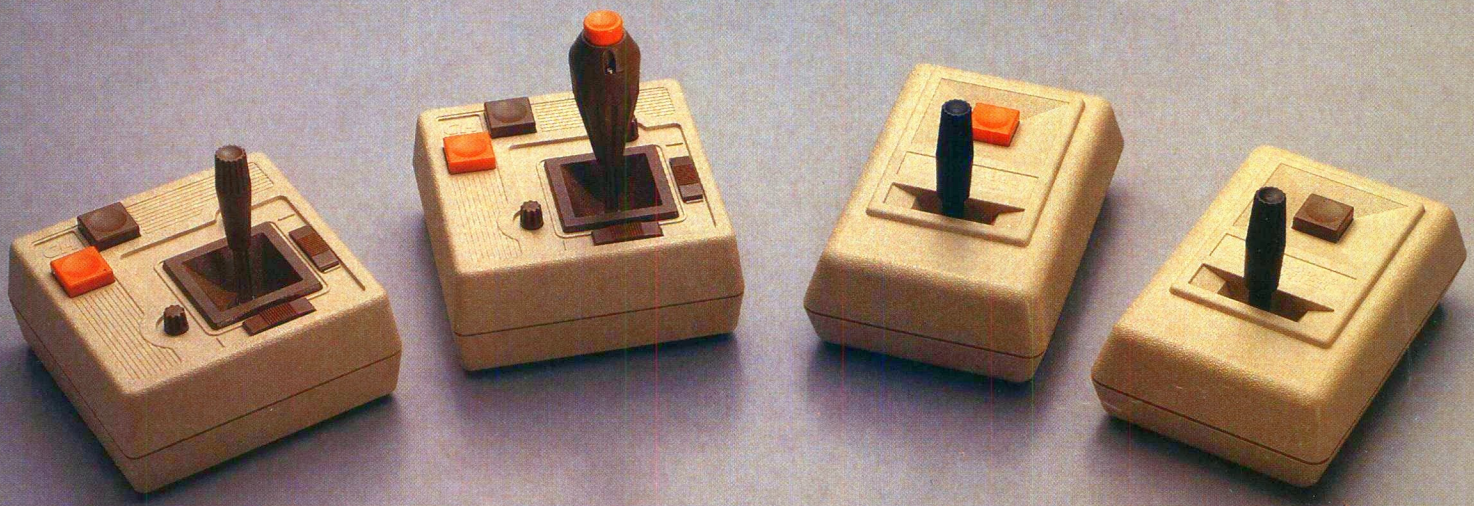

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Circle 1 on Reader Service Card

12 Good Reasons Why RAMWORKS™ Is The Best Expansion Card For Your IIe

1 APPLEWORKS MEMORY Even though Ramworks enhances and expands a VAST ARRAY of other programs, Appleworks is our claim to fame. A 64K Ramworks will ADD 46K to your available desktop memory, a 128K Ramworks will ADD 91K, a 256K Ramworks will ADD 182K, and a 512K Ramworks will ADD 364K and a 1 meg Ramworks will give you nearly an 800K desktop. And it's all done automatically! When you plug in more memory chips into your Ramworks card, Appleworks will find them—automatically. Ramworks also increases the maximum number of records from 1350 to 4300.

2 APPLEWORKS SPEED AND POWER Ramworks does more than just increase the desktop memory (as if that weren't enough). With Ramworks, Appleworks will be able to run up to 20 times faster. If you buy a 256K or larger Ramworks card, Appleworks will automatically load itself in Ramworks. This greatly increases the speed at which Appleworks operates by eliminating all that nasty, time consuming disk access on Drive 1. These are but a few reasons why we say that Ramworks is Appleworks best friend.

3 EXPANDABILITY Ramworks was designed with the future in mind, as your needs increase, so can Ramworks. Clear instructions show you how to plug in more memory (up to 1 meg).

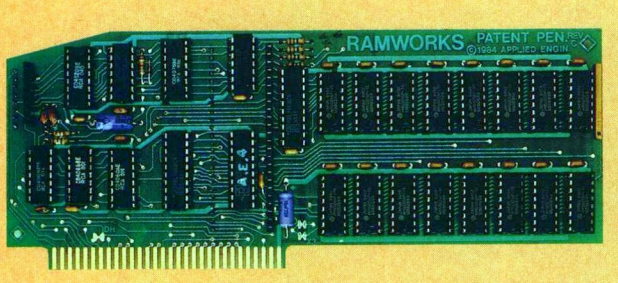
4 SPEED Today, as programs become more and more sophisticated, they inevitably become larger. And many of today's best selling programs (like Appleworks) won't fit in a 128K Apple, so many of these new larger programs continually go back to disk in search of more data. With Ramworks, you can have enough memory so that the entire program will be loaded into Ramworks' memory. This greatly increases the speed of software because your disk runs at 300 RPM, but Ramworks operates at the speed of light!

5 COLOR The same slot that's used for memory expansion is also the slot that's used for RGB color display, so all those lesser memory cards of yesterday make you decide in advance if you want RGB color. Only Ramworks lets you decide later to add RGB color. For only $129, an RGB option can be added to Ramworks to give you double high resolution color graphics and 80 column text. All with a razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of Ramworks and attaches to any Apple compatible monitor. Remember, you can order the RGB option with your Ramworks or add it on at a later date.

6 COMPATIBILITY, OF THE SOFTWARE KIND Programs like Appleworks, Magic Office System, Flashcalc, The Spread Sheet, Diverse-A-Dos, Supercalc, Magicalc and many others automatically recognize all or most of Ramworks memory (512K is average). The simple fact is that Ramworks is compatible with more off-the-shelf software than any other RAM card. Ramworks is 100% compatible with ALL software written for the Apple 80 column and extended 80 column card. Additionally, Ramworks can emulate other RAM cards so software written for other cards will run without modification. Software written for RAMWORKS will not work on other cards. We can emulate others, but others can't emulate us.

7 COMPATIBILITY, OF THE HARDWARE KIND Unlike others, Ramworks is fully compatible with hardware add on's from other companies, like the Sider and Profile hard disks. And Ramworks was designed in accordance with the official expansion rules defined by Apple so you don't have to worry about compatibility problems. As you continue to expand and make your Apple more powerful with other expansion products from Applied Engineering, you'll appreciate how each product has extra features designed to work with Ramworks and other products to give you a total performance package that is more powerful than the sum of its parts.

8 IT SELLS THE MOST Popularity translates into great software support because software companies can't support all RAM cards, they can only support the ones their customers are likely to own. And software companies appreciate the fact that when they write software for Ramworks in the IIe,



they're also writing software for our memory expansion card for the IIc, Z-RAM. And our customer list reads like the Who's Who of Apple computing with just about every software company in the land buying one, including Apple Computer (in the hundreds), Rupert Lissner, and Steve Wozniak (we didn't give one to Mr. Wozniak just to use his name, 2 one meg Ramworks were paid for at full price).

9 IT'S FROM APPLIED ENGINEERING Unlike most of the competition, we only make accessories for Apple, so we'll never spend your money on IBM product research. Applied Engineering's years of experience and wide product line really pays off, and because of our high sales levels we buy most of our I.C. chips factory direct. So don't let our low prices fool you, they're caused by high volume production. That's why we can offer the most memory for the least money. Guaranteed!

10 IT'S GOT IT ALL

- ☑ Sharp 80 Column Text
- ☑ Double high resolution graphics (with or without RGB option)
- ☑ User Expandable to 1 Megabyte
- ☑ Can Use 64K or 256K RAMS in any combination
- ☑ Adds Memory to Appleworks
- ☑ Accelerates Appleworks
- ☑ 100% Compatibility with All IIe software
- ☑ RAM Disk software available, compatible with Applesoft, PRO-DOS, DOS 3.3, and PASCAL ($29)
- ☑ RAM Disk available for CP/M ($29). (This program is included with our CP/M card)
- ☑ Visicalc preboot available ($29)
- ☑ RGB option
- ☑ Takes only one slot
- ☑ 3 year no hassle warranty

11 THE PATENT OFFICE HAS ONE There are many advanced features on Ramworks, but two parts of the design are so advanced we applied for patents. One patent application deals with our ultra fast, ultra smooth 80 column screen display, and the other patent application deals with our ingenious way of dramatically reducing the power and heat of memory chips and improving reliability at the same time.

12 HERE TODAY, HERE TOMORROW In the seven years we've been making products for the Apple, we've seen a lot of companies come and go. Although nothing is forever, we're growing, expanding and we're profitable. And we are totally committed to Apple computing, which means you'll never run out of things to do with Ramworks. Or for that matter, reasons to buy one.

Ramworks™ with 64K	**$179**
Ramworks™ with 128K	**$249**
Ramworks™ with 256K	**$299**
Ramworks™ with 512K	**$399**
Ramworks™ with 1 MEG	**$649**
RGB Option (can be added later)	**$129**

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Volume 8, Number 6 — June 1985

Official Publication of A.P.P.L.E. Co-op

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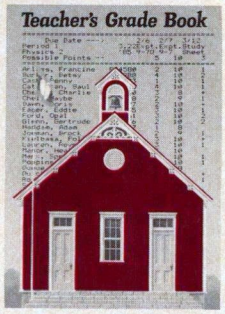

Education in America has come a long way from the one-room schoolhouse. As artist Ron Keister suggests here, the educational computer revolution looms just over the horizon.

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To a World of Compromise, We Make No Contribution

THE NEW TIMEMASTER II H.O.

- Absolutely, positively, totally PRO-DOS and DOS 3.3 compatible.
- Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond compatibility).
- 24 hour military format or 12 hour with AM/PM format.
- Date with year, month, day of week and leap year.
- Eight software controlled interrupts so you can run two programs at the same time (many examples are included).
- The only card recognized by both the DOS 3.3 and PRO-DOS versions of Apple Writer IIe.
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- Compatible with ALL of Apple's languages. Many sample programs for machine code, Applesoft, CP/M and Pascal on 2 disks.
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- Rechargeable nickle-cadmium battery will last over 20 years.
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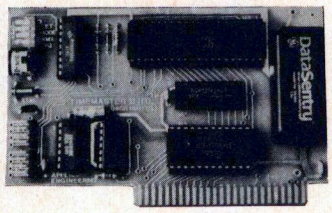

	PRO-DOS COMPATIBLE	INCLUDES DOS DATER	MILLISECOND TIME	YEAR DATA	LARGEST SAMPLE SOFTWARE	REMOTE SET PORT	BSR PORT	EMULATES ALL OTHER CLOCKS
H.O	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

Full emulation of all other clocks. Yes, we emulate Brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us. The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card.

REMOTE CONTROL

Our BSR X-10 interface option for the H.O. allows you to remotely control up to 16 lights and electrical appliances through your BSR X-10 home control system in your home or office. You're already wired because a BSR system sends its signals over regular 120 volt wiring. That means you can control any electrical device in your home or office without additional wiring.

PRICE $129.00 BSR Option (may be added later) $49.00

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- TOTALLY Videx Compatible.
- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override.
- Fully compatible with ALL Apple languages and software—there are NO exceptions.
- Low power consumption through the use of CMOS devices.
- All connections are made with standard video connectors.
- Both upper and lower characters are standard.
- All new design (using a new Microprocessor based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT-IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	139	YES	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEX	MORE	NO	YES	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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Now Includes New 4.0™ Software

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of new programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. Only CP/AM 4.0™ has advanced features like built-in disk emulation for popular memory expansion boards (those made by Apple and Applied Engineering and others) to give you a faster system with more storage. You also get menu driven utilities that are much easier to use than the older CP/M utilities so you can get down to all that great CP/M software faster. If you already own the Z-80 Plus, you can upgrade to the 4.0 software for only $29. The Z-80 Plus runs older CP/M programs too, down to Version 1.6 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence. Simply plug the Z-80 Plus into any slot in your Apple. You'll have two computers in one and the advantages of both, all at an unbelievably low price.

- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
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- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

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- It's easy to program music with our compose software. You will start right away by inputting your favorite songs. The Hi-Res screen shows what you have entered in standard sheet music format.
- Now with new improved software for the easiest and the fastest music input system available anywhere.
- We gives you lots of software. In addition to Compose and Play programs, 2 disks are filled with over 30 songs ready to play.
- Easy to program in Basic to generate complex sound effects. Now your games can have explosions, phaser zaps, train whistles, death cries. You name it, this card can do it.
- Four white noise generators which are great for sound effects.
- Full control of attack, volume, decay, sustain and release.
- Our card will play notes from 30HZ to beyond human hearing.
- Automatic shutoff on power-up or if reset is pushed.
- Many many more features.
- Works in any slot of a IIe or II+ including slot 3 of a IIe.

PRICE $159.00

Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products work in Apple IIe, II, II+ and Franklin. Applied Engineering also manufactures a full line of data acquisition and control products for the Apple; A/D converters and digital I/O cards, etc. Please call for more information. All our products are fully tested with complete documentation and available for immediate delivery. All products are guaranteed with a no hassle **THREE YEAR WARRANTY.**

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The INNER CIRCUIT

Don Elman

An All Purpose Tool

A microcomputer's power—and to some extent its complexity—stems from the fact that it is designed with no single use in mind. This is not to say that computer builders don't know or care how their products are used, but rather that the computer's inherent adaptability to new and changing needs almost rivals that of the human brain itself. A primary manifestation of this flexibility lies in the seemingly infinite variety of application software that is being created to put hardware through its paces.

While most types of computer programs focus on a specific task, a spreadsheet provides a general-purpose framework within which the user can define a customized solution to each problem without resorting to traditional programming languages. Spreadsheets have come a long way since the advent of original Visicalc, which helped establish the utility of the early Apple II. Now there are more refined versions at much lower cost (A.P.P.L.E. Co-op's **THE Spreadsheet**), and sophisticated, "integrated" packages that combine several functions with greater memory capacity (**AppleWorks**). Given it's generality and ease of use, we shouldn't be too surprised that AppleWorks' sales have hit the top of the software charts.

In This Issue

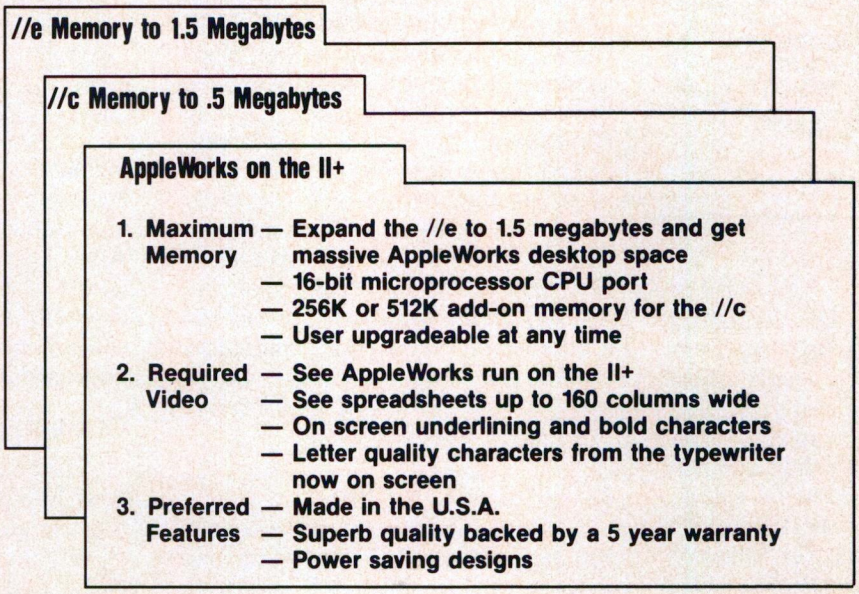
Our lead article this month is the second part of the **Practical Guide to AppleWorks**. Joyce Conklin and Peter Weiglin demonstrate how to create a teacher's grade book—a very specific application that illustrates many of the program's general features. In **THE Spreadsheet Sheet**, Jeffrey Jacques approaches the computerized schoolhouse from a similar angle by developing a gradebook on our own popular spreadsheet. We're also happy to present another installment of Randi Rost's well-received series, **The Graphics Toolkit**, which this time introduces the foundations of screen animation. A technical note by Peter Meyer discusses **A Bug in the ProDOS CHAIN Command**.

The Macintosh section features Keith Bechard's introduction and review of **Modula-2 on the Mac**, which appears to be gaining attention as a major programming language. There are also technical tips for making the best use of your hardware and software, new products, and lots more—including a challenging programming contest that encourages you to extend our newest and best Applesoft utility, A.P.E.

Welcome Back

We are pleased to announce that Kathryn Hallgrimson Suther has rejoined our editorial staff following a year of alternative but equally productive pursuits. Proudly sporting both a new baby and a new computer, Kathryn is well prepared to carry on the responsibilities of Kaiulani Schuler, who has undertaken the mission of investigating how computers are being used around the world.

AppleWorks Power!


//e Memory to 1.5 Megabytes
//c Memory to .5 Megabytes
AppleWorks on the II+
1. Maximum Memory — Expand the //e to 1.5 megabytes and get massive AppleWorks desktop space
— 16-bit microprocessor CPU port
— 256K or 512K add-on memory for the //c
— User upgradeable at any time
2. Required Video — See AppleWorks run on the II+
— See spreadsheets up to 160 columns wide
— On screen underlining and bold characters
— Letter quality characters from the typewriter now on screen
3. Preferred Features — Made in the U.S.A.
— Superb quality backed by a 5 year warranty
— Power saving designs

MULTIVIEW™

AppleWorks Now On The II+

The best selling program for the //e is now available for **all** Apples. MultiView is the first video card to offer AppleWorks versions 1.0, 1.1, and 1.2 for over one million Apple II, II+, and Apple compatible computers.

An AppleWorks configuration program is included at no charge with each MultiView to run AppleWorks on the II+ (or //e) using MultiView's 80×24 letter quality screen display.

MultiView does more than just run AppleWorks. MultiView displays razor sharp 80×24, 80×32, 80×48, 96×24, 132×24, 132×30, and 160×24 screen sizes on any standard monochrome monitor.

Super spreadsheets are possible as 132 or 160 character wide screens can show more than 12 months of financial figures on one screen without scrolling! Try a wide screen size with your favorite spreadsheet (VisiCalc, Multiplan, FlashCalc, MagiCalc, etc.) and you'll never want to go back to anything else.

Apple Writer and other word processors can also use MultiView's larger screen sizes to show on screen exactly what a printout will look like . . . no matter if elite or condensed type is printed. Even the newest ProDOS versions of Apple Writer // can work on the II+ and compatibles with our Apple Writer preboot — another first!

MultiView includes: function keys, an Applesoft line editor, screen dump, and optional light pen and international enhancements.

MULTIRAM™

Megabytes of Memory

MultiRam stops "Desktop Full" frustrations AppleWorks users experience using ordinary //e 64K fixed memory expansion cards.

MultiRam //e is expandable from 64K to ¾ megabytes using 64K and/or 256K RAM chips. Add a ¾ megabyte extension card that also offers RGB video and MultiRam //e expands to a full 1.5 megabytes. MultiRam C comes in 256K and 512K versions and is installed without messy soldering or jumpers in the Apple //c.

Each MultiRam card includes a desktop space expansion program allowing maximum memory use and ram fast speed for AppleWorks.

MultiRam //e doesn't stop with just more memory for today's programs. MultiRam is built for 16 bit processing power with an exclusive CPU port permitting direct linear memory addressing, up to 1.5 megabytes, by processors from the 8086, 68000, and 65816 processor families. A 16 bit coprocessor card will soon be available for MultiRam.

MultiRam's 64K minimum configuration retails at a pleasing $159.95 with memory upgrades available.

Now Available At Your Local Computer Dealer

Checkmate Technology, Inc.

509 South Rockford Drive • Tempe, Arizona 85281-3021
(602) 966-5802 U.S.A.
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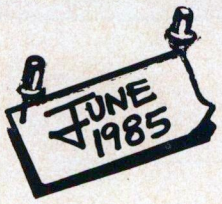
Apple Writer, AppleWorks, Applesoft, and ProDOS are trademarks of Apple Computer, Inc.
FlashCalc is the trademark of VisiCorp, Inc.
MagiCalc is the trademark of Artsci, Inc.
Multiplan is the trademark of Microsoft
VisiCalc is the trademark of Software Arts, Inc.

Circle 39 on Reader Service Card

MEMBER BILLBOARD



Don Elman

Dividend Update

As of early May, our accounting department is in the final stages of preparing A.P.P.L.E. Co-op's official financial balance for fiscal year 1984. When that process is complete, we will be able to announce whether and how much the patronage dividend will be. Since this is our first partial year as a co-op, we're sure you understand why we must put in extra effort to make certain that everything is done accurately and properly. In the meantime, thanks for your patience and support.

Apple II Memory Expansion

Our Product Development group is interested in feedback about how people are using (or not using) 128K RAM cards on an Apple II or II+. Since these cards do not necessarily expand the *usable* memory space for many applications, such as Applesoft programs, we are curious to know in what situations they have been successfully or unsuccessfully used. This information may lead to the development of new products to meet the expanding needs of Apple II owners. Please send a note summarizing your experiences to: A.P.P.L.E. Co-op, Product Development, 290 S.W. 43rd St., Renton, Washington 98055.

Finding Facts Fast

After seven and a half years of bringing you the best technical tips, programming tutorials, feature articles, and product reviews, the accumulation of *Call -A.P.P.L.E.*'s published information amounts to quite a library. Even if you've saved all your back issues, searching for the answer to a particular question might be no faster than looking for a needle in a haystack.

With this in mind, we are happy to call your attention to our recently released index-on-a-disk, *Call -A.P.P.L.E. FASTFIND* (Product code: SFAST; Price: $15.00; Weight: 8 oz.), which has already proven to be an invaluable aid for many people including our hotline and editorial staff. We plan to update this index periodically. Also, keep in mind that *most* back issues of *Call -A.P.P.L.E.* magazine and all *In Depths* are available for purchase along with the disks of programs published in those issues.

Chosen Readers

The following members have had their Reader's Choice cards drawn at recent monthly meetings, winning them each $100 credit toward A.P.P.L.E. Co-op products: R. A. Heynneman of Santa Clara, CA, and Robert Siebert of Orange, CA. Congratulations, and thanks for your valued feedback! We strongly encourage all members to return these postage-paid cards each month so that we can keep *Call -A.P.P.L.E.* on track with your needs an interests.

A.P.P.L.E. Consultants

'C'	Phil Pearson	(603) 362-4297
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Apple III (East)	Carmen Picardi	(603) 895-4447
Apple III (East)	Harry T. Hanson	(201) 467-0712
Apple III (East)	Stuart Yusem	(609) 822-9306
Apple III (West)	Bob Huelsdonk	(206) 542-7122
Apple IIe (EAST)	John Hall	(617) 241-9050
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AppleSoft	Leon Raesly	(301) 460-0754
Assembly Language	Don Lancaster	(602) 428-4073
Assembly Language	Scott Zimmerman	(801) 378-4100
Assembly/CP/M (East)	Dennis Baumgarte	(914) 856-3617
CP/M (Midwest)	Murray Arnow	(312) 878-0113
CP/M (West)	Kevin Talbot	(206) 232-7058
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DBASE/PFS	Leon Raesly	(301) 460-0754
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Macintosh (Midwest)	Tim Smith	(309) 734-7451
Mathematics	Stowe Keller	(804) 971-6876
Music	Stephen F. Lee	(704) 876-3444
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Pilot	Earl Keyser	(612) 429-5570
Pilot	Randy Warrens	(608) 837-9566
ProDOS/APPLIIe	Cecil Fretwell	(319) 236-0961
Statistics/Educ	Rich Hoffman	(513) 529-5533
Stock Market	Robert Wood	(703) 893-9591
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Visicalc (South Africa)	Brian Abrahams	(Durban) 315442
Visicalc (South)	Dr. Bob Richard	(504) 466-0894
Word Processing	Leon Raesly	(301) 460-0754

Call -A.P.P.L.E. consultants are unpaid volunteers and perform a valuable service. Before placing a call, please make sure you know the time zone you are calling to. No calls after 9pm please. Sometimes a consultant will have you leave your name and number and later return your calls. In all fairness, please expect the return call to be collect. We are always looking for more consultants. If you see an area that needs coverage, please drop us a note c/o *Butch Greathouse* with your qualifications and availability.

A.P.P.L.E. Co-op New Products

Books

INSIDE THE APPLE IIC by Gary Little

Finally we have a good inexpensive reference manual for the IIc! If you have ever wondered how the serial port works or what the pinouts of the game ports are, you can find the answers here. More than 350 pages of excellent material.

PRODUCT: Inside the Apple IIc
PRODUCT CODE: PIN2C
PRICE: $15.75
SHIPPING WEIGHT: 1 lb. 12 oz.

APPLE PRODOS: ADVANCED FEATURES FOR PROGRAMMERS by Gary Little

This great manual includes an overview of ProDOS, file management, the Machine Language Interface, the Basic.System, interrupts, clock drivers, disk drivers, and more. This is a must for anyone interfacing on an advanced level with ProDOS.

PRODUCT: Apple ProDos: Advanced Features for Programmers
PRODUCT CODE: PPDOS
PRICE: $15.00
SHIPPING WEIGHT: 1 lb. 6 oz.

THE POWER OF APPLEWORKS

This tutorial manual will teach you how to get the most our of the Appleworks word processor, spreadsheet and database. Includes tips on data entry, report formatting and valuable exercises on spreadsheet applications including accounts payable, maintaining a stock portfolio, amortization and checkbook balancing.

PRODUCT: The Power of Appleworks
PRODUCT CODE: PAPWRK
PRICE: $16.00
SHIPPING WEIGHT: 1 lb. 0 oz.

Apple II

ZARDAX 6.0

NEW FEATURES! NEW LOW PRICE! Zardax, our best word processor program, is now copyable. Making backups and installing Zardax on hard disks is a breeze. We like supporting Zardax so well, we can guarantee that it will configure to your system. Simple menu selection for your printer (over 57 varieties supported), interface card, and kind of video display. Keyboard connector required for use with Apple II, II+.

PRODUCT: Zardax Version 6.0
PRODUCT CODE: SZARII (II+, IIe, IIc)
PRICE: $99.00
SHIPPING WEIGHT: 2 lbs. 0 oz.

PRODUCT: Zardax Keyboard Connector
PRODUCT CODE: HZARKY
PRICE: $7.00
SHIPPING WEIGHT: 5 oz.

MULTIVIEW SPREADSHEET DRIVER

Get full power out of THE SPREADSHEET 2.0 and the Multiview 80/160 video card. This clever driver allows you to select all of the Multiview display modes simply by returning to the configuration menu. You can change display widths at any time without destroying your spreadsheet data.

PRODUCT: Multiview Spreadsheet Driver (Apple II)
PRODUCT CODE: SMSDRV
PRICE: $10.00
SHIPPING WEIGHT: 4 oz.

P.D.S.

NEW PUBLIC DOMAIN DISKS

Apple II PDS #501 Forth Demonstration by the A.P.P.L.E. Forth Special Interest Group. Here is a good way to get a seat-of-the-pants feel for this expandable but fast and compact programming language. The well-polished demonstration contains a tutorial, sample programs, a visible stack simulator, and side-by-side programs illustrating differences between Applesoft and Forth.

Mac PDS #8 MacClone* disk copier, Iago game, Megaroids* (shoot-'em up), Painter's Helper* MacPaint Enhancements, Bash Big Blue* game, Apple's Font/Desk Accessory Mover

Mac PDS #9 System update 4.1 including Finder version 4.1, MacWrite 4.2 for files as big as your disk, Desk Cal* calendar program.

Mac PDS #10 Andy Hertzfeld's Switcher Version 2.5 for switching applications quickly in a 512K Macintosh.

*Distributed as "Shareware". If you use the program, send money directly to the author.

PRODUCT: Mac PDS
PRODUCT CODE: SMCPDS (Specify #)
PRICE: $7.00
SHIPPING WEIGHT: 2 oz.

PRODUCT: Apple II PDS
PRODUCT CODE: SPDS (Specify #)
PRICE: $5.00
SHIPPING WEIGHT: 1 oz.

Macintosh

MAC.TRANSFER

Mac.Transfer is an incredibly easy way to transfer information between the Macintosh and an Apple II+, IIe or IIc. Transfers can be made via modem at 300 or 1200 baud, or by directly connecting the two computers together using the Imagewriter printer cable and an Apple Super Serial card or equivalent. Mac.Transfer comes with two program disks. (One for the Mac and one for the Apple II) and an instruction manual.

PRODUCT: Mac.Transfer (Mac, II, II+, IIe, IIc)
PRODUCT CODE: SMCTRN
PRICE: $33.75
SHIPPING WEIGHT: 8 oz.

AIRBORNE

Armed only with an anti-aircraft gun and mortar, you alone defend your feeble position on the beach from relentless waves of enemy paratroopers, tanks, and screaming fighter jets armed with deadly accurate air to ground guided missles. ACTION PACKED from the word go with realistic sound effects featuring actual recorded sounds, the only question is: How long can you hold them off? Mac animation at its best.

PRODUCT: Airborne (Mac)
PRODUCT CODE: SMCAIR
PRICE: $26.25
SHIPPING WEIGHT: 8 oz.

CLICKART: EFFECTS

ClickArt: Effects is a MacPaint desk accessory that allows you to rotate, slant, distort, or add perspective to a selected image. Rotate an image 360 degrees in one degree increments, slant it right, left, up, or down; distort an image by pulling one or more edges away from the center. All functions are available from the Accessories menu while you are using MacPaint.

PRODUCT: Clickart: Effects (Mac)
PRODUCT CODE: SMCEFC
PRICE: $37.50
SHIPPING WEIGHT: 8 oz.

ORDERING CHECKLIST

To speed all orders, please include:

1. Your Name as it appears in our records (same as on your mailing label)
2. Member number and expiration date
3. Complete STREET ADDRESS (**not** Box number — see explanation below)
4. Phone number to reach you by day if we have questions
5. Payment Including:
   - Handling charge if applicable
   - Domestic or Foreign Shipping Charges
   - Magazine Postage if applicable

(Sorry, we do not accept COD or Purchase Orders on individual memberships)

Each item you order needs:

6. Complete product name (and version if there is more than one product of that type)
7. Product Code

SHIPPING ADDRESS: We normally ship products by United Parcel Service (UPS). Therefore, the shipping address on your order cannot be a post office box. You may specify a P.O. Box for orders weighing less than 8 ounces. You also may make special arrangements for shipping some items via US Mail, Air Parcel Post, or UPS Second Day Air.

DOMESTIC SHIPPING CHARGES

SHIPPING WEIGHT	COST
Up to 5 Lbs.	$ 2.00
5 - 10 Lbs.	3.00
10 - 15 Lbs.	4.00
15 - 20 Lbs.	5.00
20 - 25 Lbs.	6.00
25 - 30 Lbs.	7.00
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35 - 40 Lbs.	9.00
40 - 45 Lbs.	10.00
45 - 50 Lbs.	11.00

UPS 2ND DAY AIR

WEIGHT NOT TO EXCEED	48 STATES A	HAWAII D
1 lb.	$3.00	$4.53
2 "	4.00	5.71
3 "	5.00	6.89
4 "	6.00	8.07
5 "	6.50	9.25
6 "	7.50	10.43
7 "	8.50	11.61
8 "	9.50	12.79
9 "	10.50	13.97
10 "	11.50	15.15
11 "	12.50	16.33
12 "	13.50	17.51
13 "	14.50	18.69
14 "	15.50	19.87
15 "	16.50	21.05
16 "	17.50	22.23
17 "	18.50	23.41
18 "	19.50	24.59
19 "	20.00	25.77
20 "	21.00	26.95
21 "	22.00	28.13
22 "	23.00	29.31
23 "	24.00	30.49
24 "	25.00	31.67
25 "	26.00	32.85

FOREIGN SHIPPING CHART

POSTAL TABLE	Zone I West Indies Central America, Columbia, Venezuela	Zone II All South American Countries (except in Table I), Europe, N. Africa	Zone III Asia, Mid East, S. Africa Australia and Pacific Islands
0-4 oz.	$ 1.51	$ 1.96	$ 2.41
4-8 oz.	2.13	3.04	3.95
8-12 oz.	2.75	4.12	5.49
12-16 oz.	3.37	5.20	7.03
16-20 oz.	3.99	6.28	8.57
20-24 oz.	4.61	7.36	10.11
24-32 oz.	5.85	9.52	13.19
2-3 lbs.	8.29	13.84	19.39
3-4 lbs.	10.73	18.16	25.59
Each additional ½ lb. over 4 pounds add:	1.22	2.16	3.10

CANADA SHIPPING RATES

0-4 oz.	$ .76
4-8 oz.	1.48
8-12 oz.	2.20
12-16 oz.	2.84
2 lb.	3.92
3 lb.	5.00
4 lb.	6.08

For weights over 4 lbs: $6.08 + $1.08 additional per pound.

CODE	PRODUCT	Shipping WT.	UNIT PRICE	Amount
1.				
2.				
3.				
4.				
5.				
6.				

Total Shipping Weight _____ **SUBTOTAL** _____

Washington residents add 8.1% sales tax _____

Total Shipping Cost _____

$3.00 Handling charge if order is under $25.00 _____

TOTAL AMOUNT _____

Mail to:
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290 S.W. 43rd St.
Renton, WA 98055
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Order

Date _____

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Membership No. _____

Expiration Date _____

Address _____

City _____

State/Country _____

Zip _____

Phone _____

Social Security/Tax I.D. No. _____

☐ **Check enclosed**

☐ **VISA**

Account No. _____

Exp. Date _____

☐ **Mastercard**

Account No. _____

Exp. Date _____

Signature _____

The Great A.P.E. QuickType Contest

A powerful feature of the Applesoft Program Editor (A.P.E.) is its QuickType capability. The function can save you keystrokes or execute short machine language programs. A QuickType function can even accept input from the keyboard and base its action upon that input. During the development and testing of A.P.E. we amused ourselves with many of the possibilities. We suspect that some A.P.E. users have invented even more exotic functions than we ever dreamed of. To find out, we present the Great A.P.E. QuickType Contest.

A disk will be created with a collection of the best contest entries with credits to their authors. Each person who enters the contest will receive a copy of this disk. Let's hear from all you primatologists!

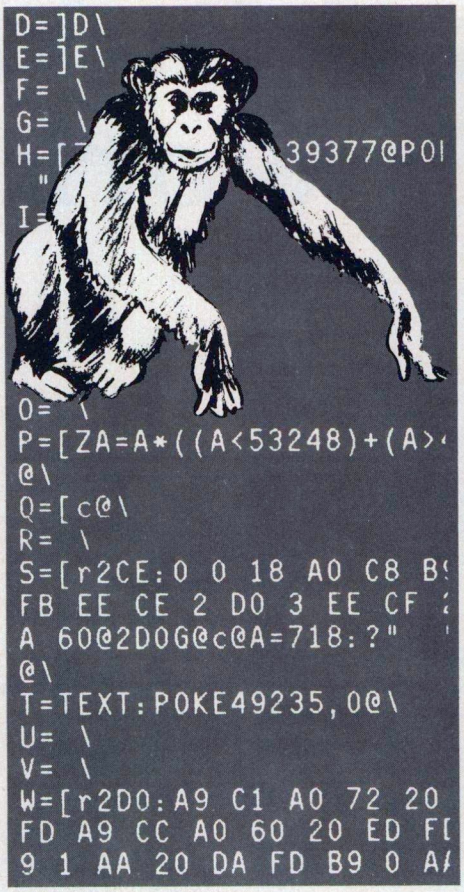
PRIZES

All prizes are for credit toward the purchase of A.P.P.L.E. Co-op products.

1st: $250 2nd: $150 3rd: $75

Send entries to:

Great A.P.E.
QuickType Contest
A.P.P.L.E. Co-op
290 S.W. 43rd Street
Renton, WA 98055



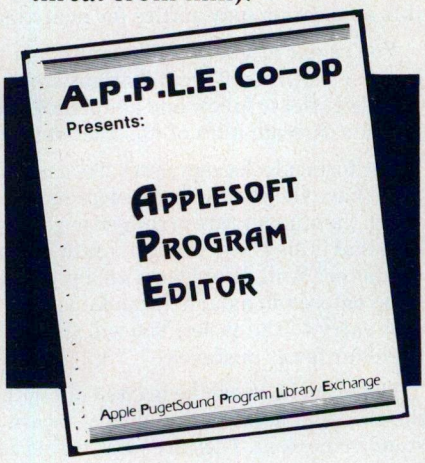
Try this one:

F=xg[KKKKKKKItZu[uuuE@

Remember "[" stands for ESC, lowercase for control characters. It is used to pick up the Current Filename from the screen after doing a CATALOG. First it positions the traveling cursor at the first column of the filename in the CATALOG. Then you press I to move the cursor up to the name you want as your current filename, then press RETURN. That's all there is to it. Now press CTRL-P to verify the result. Yup... there's the new Current Filename.

RULES

1. Entries must be postmarked by August 15, 1985.
2. Entries become the property of A.P.P.L.E. Co-op.
3. Machine language routines which are not your own must give proper credit to the author and state where the routine was published.
4. All entries must be submitted using the standard QuickType notation generated by the Print.QT program.
5. An explanation of how to use the function, limitations on its use, and what it does must be included.
6. Special consideration will be given for originality as well as use of the advanced features of QuickType.
7. Bruce Tognazzini is *not* excluded from this contest. (This contest has been carefully timed to coincide with a new project of his: debugging some vintage versions of File Cabinet, thus eliminating a threat from him).



Applesoft Program Editor

from A.P.P.L.E. Co-op

Applesoft Program Editor is our premier tool for writing and debugging Applesoft programs, a good learning aid too! **Only $30.00, Product Code: SAPE, Shipping Weight: 1 lb.**

Practical Guide to AppleWorks—Part 2

Joyce Conklin & Peter Weiglin

This month, we're going to look at a specific application for AppleWorks; we told you that we weren't just going to paraphrase the manuals. The chosen application stems from questions and comments we've received lately. Many teachers have AppleWorks, and would like to know how to use it to construct a grade book. The easiest way is to use the spreadsheet. Author Conklin's first spreadsheet gradebook was developed when the only program available was the venerable VisiCalc. With AppleWorks, many of the "wish-list" improvements are now accessible, such as variable width columns and sorting capability. There are commercial grade-book programs available, but this application may suffice for many teachers.

You're not a teacher? We invite you to read along anyway, because the principles apply to any small data recording system, and it's easier to follow and adapt an example to your needs than to wade through piles of abstract stuff.

The format looks very much like a regular grade book. It's useful to have the grades hand-recorded on a sheet, in the order in which the students are arranged in your system. Some folks have said that if they have to record data that way, why bother with a computer? Well, Hint One with any program is to have the data to be entered in as understandable a form as possible, so your data entry will be easier. You will also find that the computer will make far fewer mistakes.

The gradebook can be printed out with little added effort and the students are thereby always aware of exactly where they stand in the class. They are *quick* to find data-entry errors, which saves you the time of having to look for them! Best of all, calculations required for final grades are infinitely easier, as all you have to do is press Open-Apple-K and the calculations are done! No more streamers of adding-machine tape or dented fingers from calculator buttons.

General Layout

There are four different sections of the gradebook; tests, homework and labs, summary scores, and attendance. If you choose to assign a numerical value to attendance, then place this section at the top of your template, so that all calculations are done in order. If you have the sections in the order shown above, it will require two re-calculations (Open-Apple K's) for the summary section to be completely correct.

Use the following values in making the original template: Col. A is three spaces wide, and is a blank column; this allows sufficient left margin so that the pages may be punched to fit in a loose-leaf binder. Col. B is is 18 spaces, which allows room for the first and last names of all but the longest names. Col. C is seven spaces, which allows for our six-digit student number plus a blank leading space. All reports are coded by this student number, so it's vital that the information be included in the grade book. Each of the remaining columns is five spaces wide.

Since the default value for column width in AppleWorks is nine, the procedure for revising column width for most columns up the columns is as follows: Type Open-Apple V (Values). Move the cursor to Column Width, or type "C". Remember that on AppleWorks menus, you may use either the arrow keys to move the cursor or simply type the number or first letter of the desired function. Then use Open-Apple and the left arrow key to reduce all columns to 5 spaces. In this example, you could press Open-Apple V; arrow the cursor two menu items to the right; press <RETURN>; Open-Apple and the left-arrow key four times; press <RETURN> again. Or you can, somewhat, short-cut this with Open-Apple V, C, Open-Apple and left-arrow four times, <RETURN>. Notice that if you use the initial letter (<C> in our example) rather than moving the cursor to select the function, you do not need to press the <RETURN> key.

Now that we have our standard column width, we must change the widths of columns A, B, and C. Since each of these is a different width, they must be changed one at a time. The key-stroke sequence (using the initial-letter method) is:

Column A: Open-Apple-L, <C>, <RETURN> — this is to select the single column rather than a series of columns. <C> again, to select "Column width", Open-Apple and left-arrow key twice, to reduce the width to three spaces, <RETURN>.

Your Apple® IIc. Now, you don't have to leave home without it!

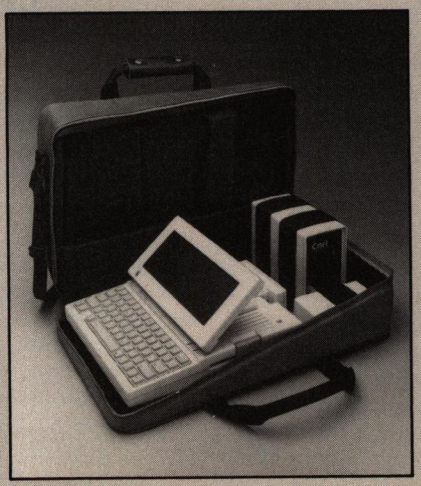
Discwasher® introduces Cari™. The portable powered work station for the Apple IIc.

Now you can use your Apple IIc wherever you go, even when there's no AC power source available. Because now there's Cari™ from Discwasher, the portable powered work station designed just for the Apple IIc.

The handsome, protective case stores your computer, LCD monitor and accessories. So compact, it fits under an airplane seat. With the self-contained, rechargeable power system, your computer is always ready to go to work. Just unzip Cari, power up and start computing.

Even when AC power is available, Cari protects against the adverse effects of a power failure. The built-in battery becomes your computer's power source automatically, providing an uninterruptible power supply.

So don't leave your Apple IIc at home or in the office. Take it along with the Discwasher Cari. It's available at your Apple dealer, with other Discwasher accessories for your Apple IIc: Calling Four™ II Controller Port Expander and Serial-to-Parallel Printer Port Adaptor.



discwasher®

Cari™

Portable Powered Work Station

Discwasher, 1407 North Providence Road, P.O. Box 6021, Columbia, MO 65205. Phone: 314/449-0941.

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Circle 6 on Reader Service Card

Column B: Open-Apple-L, <C>, <RETURN>, <C>, Open-Apple and *right*-arrow thirteen times to increase the width to 18 spaces, <RETURN>.

Column C: Open-Apple-L, <C>, <RETURN>, <C>, Open-Apple and right-arrow twice to increase width to 7 spaces, <RETURN>.

Having done this, you may then print up to 23 columns, through column W, in 8½ inches, if you use condensed type which is 17 characters per inch. (See the discussion of printer settings later in this article.) If you start recording your scores in Column D and use Column W for the totals (they will transfer more easily to the summary section, although this is not absolutely necessary), you will have room for 19 separate grades on each row. Since most semesters are 18-19 weeks long, this should allow more than enough space for tests. If you have more than 19 homework and lab assignments during the course of the semester, you may duplicate the section for these grades and add them into the summary section.

Rows 1-4 of the spread sheet are used to record the information about data entry areas and the printer constants. This information shows in the leftmost area of the spreadsheet, so it is visible when the template is first displayed. We designed this spreadsheet to take advantage of AppleWorks' ruler: the Open-Apple-1 through Open-Apple-9 commands that let you step vertically through a spreadsheet, data base, or word processor document. Using the locations shown in Fig. 1, the lab and homework section can be readily displayed by pressing Open-Apple-3; the summary section with Open-Apple-5; and the attendance section with Open-Apple-7. This is primarily because of the number of students in the class. With fewer or more students, you will have to experiment to find out where your file breaks are, but it is certainly faster to move to a new section using the Open-Apple-# method, than by specifying an exact coordinate.

Resetting Standard Values

One more step should be taken before setting up your template. The default mode for AppleWorks is to recalculate all values after each data item entry. With a spreadsheet of any size, you can spend many seconds waiting for the recalc while entering data. So, select a default mode of Manual Recalculation, and then recalculate with the Open-Apple-K command whenever desired. To set this alternate default mode, use the following keystrokes:

Open-Apple-V, <R>, <F>, <M>

At the same time you should set the recalculation order to Rows, rather than the AppleWorks default setting of Columns. Do this by:

Open-Apple-V, <R>, <O>, <R>

Headings

Headings of each section are set off using a double line, made by the use of the equals sign in the label format. With the cursor in cell A5, press < " > to indicate a label, <=> three times, and <RETURN>. Then you may Copy this cell across the spreadsheet to Column W, or as far as you wish to go. The next four rows contain information about the individual entries, as shown in Figure 2, and the class, period, and date of the last entries. The date is entered in cells C7 and C8 in the example. C8 contains the year, which will change only between December and January. The month and day, however, should be changed each time you update your gradebook. Enter the date as a decimal value; in this way you need make the change only in C7 and the recalculation will copy the result into each of the other date cells (in the homework, summary, and attendance sections.) To make sure that even a date such as 2.10 (February 10) will not appear as 2.1 because the zero was dropped, put the cursor at cell C7 and make the following changes:

Open-Apple-L, <E>, <V>, <F>, <2>, and <RETURN>

If you enter the year as 1985 it will be right-justified under the 2.10; if you enter it as '85, you will have to use the label format (press the < " > first) and then use the space bar to place the '85 where you want it. This heading section can be completed with another double line, copied in its entirety from Row 5. With the cursor at A5, press Open-Apple-C, <RETURN> (to select "Within the worksheet"), right-arrow once (move the cursor to B5), < . > (to extend the source area), right-arrow to the end of the double line, <RETURN>, move the cursor to A10 (with the down-arrow), <RETURN>

The Formulas

All cursor positions referenced in the following discussion are predicated on the 31 students enrolled in the example class. Column positions will be the same for any template; row positions will vary depending upon the number of students enrolled. For ease in formatting the printout, there are two blank rows at the end of each section of the gradebook.

Now it's time to enter the formulas. Columns U and V will contain information concerning the final exam; therefore the total of all other tests will include the scores in columns D through T inclusive. That's a job for the SUM function. Place the cursor at W9 and enter the formula:

@SUM (D9 . T9) <RETURN>

Remember, you do not have to capitalize the information in the formula, and you only need to enter a single dot. You do have to close the parentheses. When the formula shows at the bottom of the screen it will contain three dots and the letters will have been capitalized. Copy this formula, using the following sequence:

Open-Apple-C **<RETURN>** **<RETURN>** ("Within worksheet" and "highlight source")
Down-arrow twice (to move the cursor to W11)
< . > (to extend the destination)
Down-arrow repeatedly to the bottom of the section (W41 in our example)
<RETURN>.

You will then be asked to indicate a reference to D9 as either "No change" or "Relative"; press <R>. The request will again be made in reference to T9; press <R> again. The formula summing the test scores will then be in each cell of column W. The current value in each cell will be zero since you have not entered any scores.

Repeat this process for the homework/lab section, placing your total of possible points in W48, and Copying the formula from W50 through W80. Now you may move to the summary section. The heading is shown in Fig. 3. In our sample classes (physics and chemistry) the tests are weighted at 75% of the total score, the labs at 25%. Rather than try to keep track of how much each lab should be worth at the moment, each is graded on a 10 point scale, and this score is adjusted by multiplying by the following factor:

Test total / 0.75 = Maximum points
Maximum points - Test total = Maximum lab points
Maximum lab points / current lab total = Correction factor

This allows the weighting to be constantly readjusted after each test. While there have been very few labs up to this point in the semester, there will be a large number upcoming in the next few weeks. The correction factor will change, probably to a number less than 1, as more lab reports are submitted. The current total score is the sum of the test total and the *adjusted* lab score. At the end of the semester, the final exam score is added to the total. The formulas for the summary section, therefore, are:

Cursor at E87: **+W9** (total possible test points)
Copy this formula from E89 through E119, Relative.

Table 1

```
Data Entry Areas:                                  Printer Constants:
  Tests:A11-Z43    Totals:A91- M123                 CI=17;LI=8;PH=No
  Labs: A51-Z83                                   Attence Entries  at:
                                                  A131--Y163
```

Table 2

Due Date --->		2/13		2/25		3/08		3/22	
Period 1	3.22	Test	Chal.	Test	Chal.	Test	Chal.	Test	Chal.
Physics 2	'85	Ch.9	9	Ch.14	14	Ch.15	15	Ch.16	16
Possible Points --		41		37		34		23	

Due Date --->		2/6	2/7	3/12
Period 1	3.22	Expt.	Expt.	Study
Physics 2	'85	9-70	9-7	Sheet
Possible Points --		5	10	3

Table 3

			Lab Factor = 2.5		
Period 1	3.22	Total	Total	Adjust.	Total
Physics 2	'85	Test	Lab	Lab	Points
Possible Points ------>		135	18	45	180

Table 4

Due Date --->		2/13		2/25		3/08		3/22	
Period 1	3.22	Test	Chal.	Test	Chal.	Test	Chal.	Test	Chal.
Physics 2	'85	Ch.9	9	Ch.14	14	Ch.15	15	Ch.16	16
Possible Points --		41		37		34		23	
Arless, Francine	854580	38		33		23	-	20	
Bunker, Betsy	850988	22		20		14	-	16	
Cash, Penny	851123	31	1	31		19	1	14	
Catamaran, Saul	851025	27		27		26		20	
Cheese, Charlie	851000	29		29	+	23	-	21	
Chei, Maybe	851398	32		21	1	21	-	17	
Dawn, Doris	854697	30		29	-	18	1	16	
Eager, Eddie	851035	34		32		27		18	
Ford, Opal	851061	34		32		20	-	19	
Glenn, Gertrude	851076	27	-	19		21	2	20	
Haddam, Adam	860887	37		26		22		16	
Joeman, Brock	850834	32		34		19	-	17	
Kielbasa, Polly	851326	34		31		23	-	20	
Lauren, Reynold	853183	30		27		14		21	
Manor, Heathcliff	855065	28		29	-	21	2		
Marx, Spencer	851122	23		20		19	1	9	
Poppins, Marie	872983	24		28	3	27	1	21	
Queue, Suzy	860921	31		33		15		20	
Quick, Jack	851232	29	1	25	2	19	1	14	
Rojo, Ivan	851142	32		32		12	-	17	
Splycer, Jeanne	860931	36		29	-	26		23	
Steven, Shell	851269	37		34		28	1	21	
Tang, Pauline	861079	34		33		21		22	
Tang, Rachel	851301	37		28	1	20	1	20	
Tokyo, Rick	851312	32		30		21	-	17	
Turner, Nat	860938	27	1	34		23	2	20	
Upbringing, Joyous	851161	25	+	24	6	26	-	11	
Victory, Lynn	851317	34		23		16	-	20	
Wing, It	851329	36		32		18	2	18	
Wolfe, Peter	851216	30		24	-	19	+	17	
You, Orame	851334	32	2	15	2	20	1	20	

Table 5

Due Date --->		2/6	2/7	3/12
Period 1		3.22Expt.	Expt.	Study
Physics 2		'85 9-70	9-7	Sheet
Possible Points --		5	10	3
Arless, Francine	854580	2	10	1
Bunker, Betsy	850988	4	10	2
Cash, Penny	851123	1	10	1
Catamaran, Saul	851025	4	10	1
Cheese, Charlie	851000	3	8	+
Chei, Maybe	851398	2	9	1
Dawn, Doris	854697	2	10	+
Eager, Eddie	851035	3	10	1
Ford, Opal	851061	3	10	2
Glenn, Gertrude	851076	2	10	2
Haddam, Adam	860887	1	8	
Joeman, Brock	850834	2	9	1
Kielbasa, Polly	851326	3	10	+
Lauren, Reynold	853183	3	10	1
Manor, Heathcliff	855065	3	10	
Marx, Spencer	851122	1	10	1
Poppins, Marie	872983	2	10	1
Queue, Suzy	860921	1	8	
Quick, Jack	851232	2	10	+
Rojo, Ivan	851142	3	9	1
Splycer, Jeanne	860931	3	10	
Steven, Shell	851269	4	10	1
Tang, Pauline	861079	3	10	1
Tang, Rachel	851301	4	10	+
Tokyo, Rick	851312	3	10	+
Turner, Nat	860938	2	9	
Upbringing, Joyous	851161	2	10	+
Victory, Lynn	851317	4	10	2
Wing, It	851329	4	10	
Wolfe, Peter	851216	1	10	2
You, Orame	851334	2	10	1

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Cursor at G87: **+W48** (total possible lab points)
Copy this formula from G89 through G119, Relative.

Cursor at J84: **((+W9/.75)–W9)/W48** (lab correction factor)

Cursor at I87: **@INT(+G87*J84+.5)**
Copy this formula from I89 through I119, relative to G89, No change for J84.

Cursor at K87: **+E87+I87+V9** (test total plus adjusted lab total plus final exam)
Copy this formula from K89 through K119, relative to all three values.

In the attendance section of the gradebook, number of absences is recorded by week, and the running total computed. The IF function means we can flag those students whose absence rate exceeds 10% so that if their grade also starts to drop, parents can be informed. The summary columns (V = total days absent, W = percentage absent) are set up as follows:

Cursor at V126: **@SUM (D126.U126) <RETURN>**
Copy this formula from V128 through V158, Relative (this will total each student's absences for the semester.)

Cursor at W128: **@IF(+V128/V126 > .1, V128/V126, 0)**
Copy this formula from W129 through W158, Relative for V128, No change for V126.

This formula will cause a decimal fraction, printed to three digits, to be returned if the absences exceed 10% of the total days of school to date; otherwise a zero will be printed. This causes the absences of those students exceeding 10% to stand out for easy identification. You might want to modify the formula to show a percentage figure, e.g. 16.2 instead of .162; with this modification you might also want to display only a rounded integer, e.g. 16 instead of 16.2, 17 instead of 16.8. The formulas would then be:

Percentage display:

@IF(+V128/V126 > .1, V128/V126 * 100, 0)

Integer display:

INT(@IF(+V128/V126}.1, V128/V126*100, 0)+.5)

The Integer display format is not useful for the decimal display since the results would be either 0 or 1; the single digit does not show up as strikingly as the three-digit value. The number of days in the week is entered at the same time as the student absences; if they were entered earlier, the percentage-absences-to-date would be incorrect until the final week.

Entering Student Names

The only remaining task is to enter the student names (deleted in these examples) and I.D. numbers. You do NOT have to type this set 4 times, only once, and then Copy this information into the other locations. To copy the names, place the cursor at B11, and do the following:

Open-Apple-C, <RETURN>, down-arrow to B43, **<RETURN>**, move cursor with Open-Apple-down-arrow to B50, **<RETURN>**

Repeat the process, moving the cursor to B89, or to B128; repeat the entire process with the column of student I.D. numbers. The blocks of information must be copied one column at a time; you cannot copy two columns, name *and* I.D. number, together.

Figures 4, 5, 6 and 7 show the sections as they existed at the time of this article, with the names of the students coded for purposes of these illustrations. Since the printout is shown only inside the classroom, some students elect to have the names remain on the printout. You could code their names, as shown in these illustrations, or you could blank out the name column on the copy which you post in the class. For permanent records, however, you need to have a copy with the correct names.

Printing out the Information

Pressing Open-Apple-O will move you to the Printer Options section where you may set the values which will be used to get a hard copy of your gradebook. With 31 students in the class and six rows occupied by the heading information, it is necessary to set the Lines per Inch to 8:

LI <RETURN>
8 **<RETURN>**

This will allow you to print two sections on one page, so that each printout of your grade book takes two pages; tests and labs/homework on one page, summary and attendance on the second. The other standard settings are as follows:

PW 8.0
LM 0.0
RM 0.0
PL 5.5
TM 0.0
BM 0.0

Formatting options are:

SC No
PH No
SS

Chars per Inch may be set to 10, 12, or 17, depending upon the number of columns you wish to print. During the early part of the semester, the first three sections may be printed using 10 characters/inch, since there are relatively few columns of information. The attendance section must always be printed using 17 characters/inch to include all the columns through the percentage absence figures.

When you have finished with these settings, press the <ESC> key to return to the spreadsheet and select Open-Apple-P to begin printing. Your sequence of keystrokes is as follows:

Open-Apple-P <B> (to print a block)
move the cursor using right and down arrows
<RETURN>

Select the printer destination, checking at the same time to ensure that you are not printing more characters than you are allowed. AppleWorks allows 136 characters per 8-inch page width, although most dot-matrix printers will only allow 132. This is due to the fact that you cannot indicate 16.5 as the true character spacing, but must use the next integer value. Should you try to print the full 136 characters, you will find all sorts of problems! Be sure to limit your printing to 80 characters or 132, depending upon your choice of Characters per inch.

Quarter Report

Once each quarter, you can make an extra copy of the summary section, which has the student names double-spaced; then hand-enter the letter grades. The method for obtaining this sheet requires changing the Printer Options twice.

Set Paper Length to 1.0 and print out (Block) only the heading, using the previously set SS for single space.

Then Set Paper Length to 10.0 and change to DS (for double spacing). All other values, including 8 lines per inch remain the same. Print the remaining portion of the summary section (Fig. 8).

While the time required to set up the spreadsheet gradebook may be more than you would spend for a handwritten one, you will find the results worth the effort. There is an additional "halo" effect — the students seem to trust the results more than they did in the old days!

Table 6

			Lab Factor = 2.5		
Period 1	3.22	Total	Total	Adjust.	Total
Physics 2	'85	Test	Lab	Lab	Points
Possible Points ------>		135	18	45	180
Arless, Francine	854580	114	13	33	147
Bunker, Betsy	850988	72	16	40	112
Cash, Penny	851123	97	12	30	127
Catamaran, Saul	851025	100	15	38	138
Cheese, Charlie	851000	102	11	28	130
Chei, Maybe	851398	92	12	30	122
Dawn, Doris	854697	94	12	30	124
Eager, Eddie	851035	111	14	35	146
Ford, Opal	851061	105	15	38	143
Glenn, Gertrude	851076	89	14	35	124
Haddam, Adam	860887	101	9	23	124
Joeman, Brock	850834	102	12	30	132
Kielbasa, Polly	851326	108	13	33	141
Lauren, Reynold	853183	92	14	35	127
Manor, Heathcliff	855065	80	13	33	113
Marx, Spencer	851122	72	12	30	102
Poppins, Marie	872983	104	13	33	137
Queue, Suzy	860921	99	9	23	122
Quick, Jack	851232	91	12	30	121
Rojo, Ivan	851142	93	13	33	126
Splycer, Jeanne	860931	114	13	33	147
Steven, Shell	851269	121	15	38	159
Tang, Pauline	861079	110	14	35	145
Tang, Rachel	851301	107	14	35	142
Tokyo, Rick	851312	100	13	33	133
Turner, Nat	860938	107	11	28	135
Upbringing, Joyous	851161	92	12	30	122
Victory, Lynn	851317	93	16	40	133
Wing, It	851329	106	14	35	141
Wolfe, Peter	851216	90	13	33	123
You, Drame	851334	91	13	33	124

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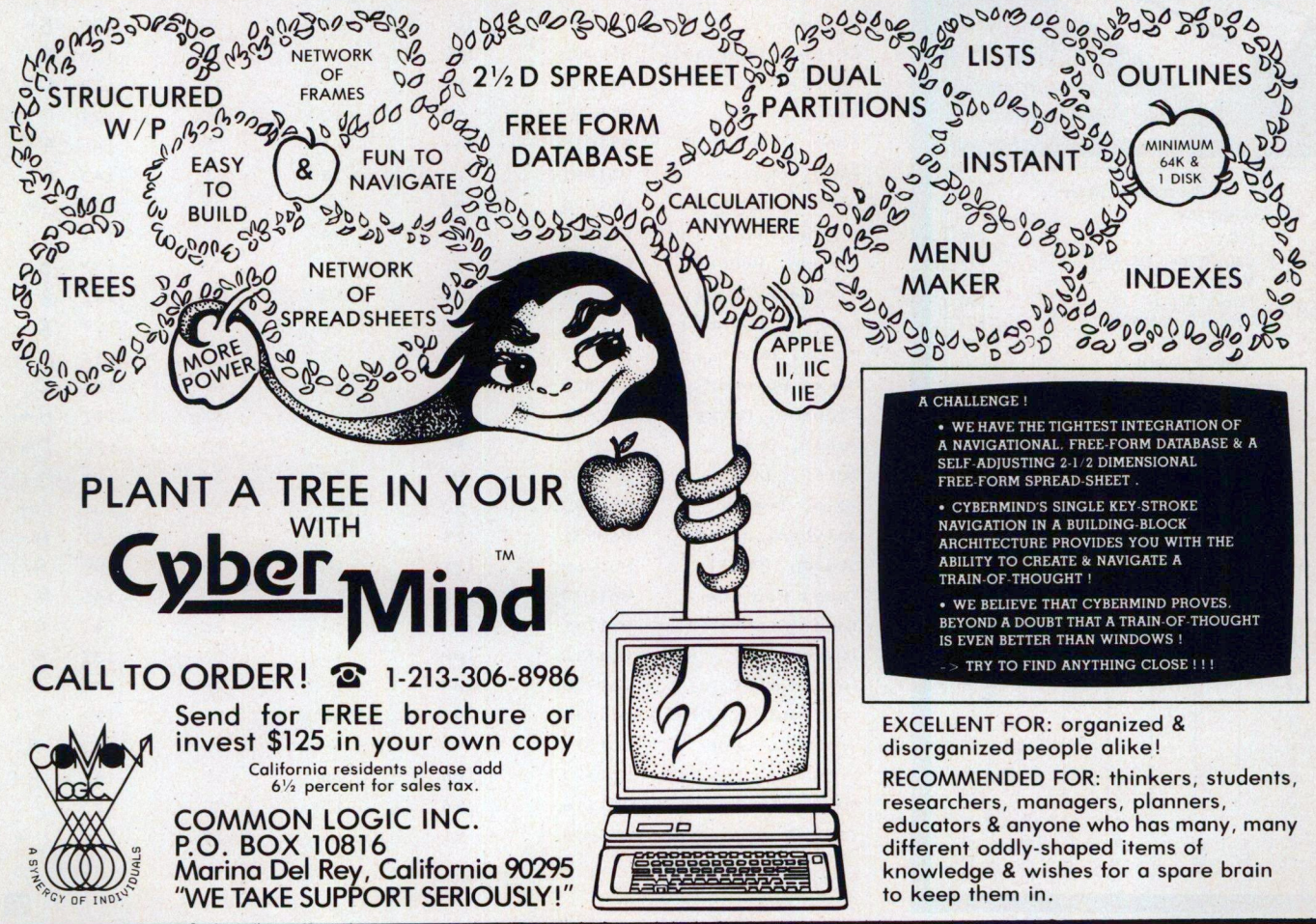

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Table 7

Attendance / Period 1 / Physics 2		3.22.85 Wk.1	Wk.2	Wk.3	Wk.4	Wk.5	Wk.6	Wk.7	Wk.8	Wk.9	Wk.10	Wk.11	Wk.12	Wk.13	Wk.14	Wk.15	Wk.16	Wk.17	Wk.18	Wk.19	Total days	%age abs.
		9	4	4	5	5	5	5														
Arless, Francine	854580		1																		1	0
Bunker, Betsy	850988						1	1													2	0
Cash, Penny	851123	1						1													2	0
Catamaran, Saul	851025																				0	0
Cheese, Charlie	851000																				0	0
Chei, Maybe	851398																				0	0
Dawn, Doris	854697						1														1	0
Eager, Eddie	851035																				0	0
Ford, Opal	851061	1	1																		2	0
Glenn, Gertrude	851076		1						1												2	0
Haddam, Adam	860887						1														1	0
Joeman, Brock	850834																				0	0
Kielbasa, Polly	851326																				0	0
Lauren, Reynold	853183																				0	0
Manor, Heathcliff	855065					2		2	2												6	.162
Marx, Spencer	851122		1	3			1	1													6	.162
Poppins, Marie	872983																				0	0
Queue, Suzy	860921																				0	0
Quick, Jack	851232																				0	0
Rojo, Ivan	851142																				0	0
Splycer, Jeanne	860931																				0	0
Steven, Shell	851269																				0	0
Tang, Pauline	861079																				0	0
Tang, Rachel	851301					1															1	0
Tokyo, Rick	851312																				0	0
Turner, Nat	860938																				0	0
Upbringing, Joyous	851161																				0	0
Victory, Lynn	851317					1															1	0
Wing, It	851329																				0	0
Wolfe, Peter	851216						1														1	0
You, Orame	851334																				0	0

Table 8

Period 1 / Physics 2 / Possible Points	3.22 '85 ------>	Total Test 135	Lab Factor = 2.5 Total Lab 18	Adjust. Lab 45	Total Points 180	
Arless, Francine	854580	114	13	33	147	A-
Bunker, Betsy	850988	72	16	40	112	C-
Cash, Penny	851123	97	12	30	127	B-
Catamaran, Saul	851025	100	15	38	138	B+
Cheese, Charlie	851000	102	11	28	130	B
Chei, Maybe	851398	92	12	30	122	C+
Dawn, Doris	854697	94	12	30	124	C+
Eager, Eddie	851035	111	14	35	146	A-
Ford, Opal	851061	105	15	38	143	A-
Glenn, Gertrude	851076	89	14	35	124	C+
Haddam, Adam	860887	101	9	23	124	C+
Joeman, Brock	850834	102	12	30	132	B-
Kielbasa, Polly	851326	108	13	33	141	B+
Lauren, Reynold	853183	92	14	35	127	B-
Manor, Heathcliff	855065	80	13	33	113	C-
Marx, Spencer	851122	72	12	30	102	D
Poppins, Marie	872983	104	13	33	137	B+
Queue, Suzy	860921	99	9	23	122	C+
Quick, Jack	851232	91	12	30	121	C+
Rojo, Ivan	851142	93	13	33	126	C+
Splycer, Jeanne	860931	114	13	33	147	A-
Steven, Shell	851269	121	15	38	159	A
Tang, Pauline	861079	110	14	35	145	A-
Tang, Rachel	851301	107	14	35	142	A-
Tokyo, Rick	851312	100	13	33	133	B
Turner, Nat	860938	107	11	28	135	B
Upbringing, Joyous	851161	92	12	30	122	C+
Victory, Lynn	851317	93	16	40	133	B
Wing, It	851329	106	14	35	141	B+
Wolfe, Peter	851216	90	13	33	123	C+
You, Orame	851334	91	13	33	124	C+

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THE Spreadsheet Sheet: Improving the Gradebook

Jeffrey M. Jacques, Ph.D.

EVER since my October/November, 1983 *Call -A.P.P.L.E.* articles on how to use THE Spreadsheet as a grade management tool, I have been getting comments and questions. While some colleagues and friends were motivated to use THE Spreadsheet for a variety of home, business and classroom applications, others just wanted "something" that would make their grade management chores easier. (Teaching a new skill seems to have widely divergent consequences for many learners—especially for those who work in the teaching professions.)

Persons from both groups had little trouble mastering the basic skills of moving the marker, entering names or grades, or even entering a formula or two. Colleagues who were looking for "something" to help with the drudgery of grade keeping/assigning often stated that they had trouble remembering what command did what. They reported that since they used THE Spreadsheet intermittently (after two or three exams were given, they would enter all the data at once), they had trouble remembering how to do certain things (e.g., /Reproduce). The inevitable question was: please build a general template that I might easily modify, say by deleting a few rows, which will serve my grade keeping needs. After all, you have convinced me that I can save time and energy, reduce my computational errors, etc., but I hate being frustrated by not remembering how to move data.

Even the group of colleagues who began using THE Spreadsheet for a variety of applications found themselves having several questions: For example:

1. How can I find a student easily when I only have their Social Security Number (SS#) on the answer sheet and 55 students in the class? After all, in every large class there is always at least one student who forgets to put his/her name on the test.
2. How can I set up a running average and tell the student his or her grade to date?
3. I want to keep track of the original class average of all those who took the exam. But when I enter a student's grade on a make-up test, everything else changes. How can I keep track of the original summary values for each test as well as the adjusted summary values?
4. Is there an easier way to compute summary classroom stats (e.g., variance, standard deviation, etc.) other than having to Replicate the column each time?
6. Not all students take all the exams. How can I set-up a section of the template which will enable me to quickly and easily compute grades for missed exams?

Using THE Spreadsheet as Mini Database

Well, this being the end of the semester, I thought I would help them out. Additionally, I thought that you might be interested in how you can use THE Spreadsheet functions to find certain records as easily, as well as some of the lesser known functions. While they are not often reported in the computer magazines, they are quite useful.

Table 1 presents a summary of what an improved grade template might look like. Most of it will be familiar to you. Columns A through J, rows 6 through 37 were structured so that each student might be listed and each grade on each test would be listed in the adjacent columns. What might be of some surprise are columns B and C. Column B lists each student's identification number or social security number. Note that these numbers were entered as values rather than labels. (There were, therefore, no dashes entered between the numerals!)

Why? Good question. You'll find your answer in column C. It is used as an easy means to identify students by social security number. Beginning in row 6, the expression:

@IF(B6 = C4,@TRUE,0)

is used. What does it do? Simple. If the value—in this case Social Security Number, stored in cell C4—is the same as that already entered in B6, display TRUE in the adjacent column, cell C6. IF the expression is false, then display a zero in cell C6. (Of course, the @IF statement remains consistent and is simply /Reproduced down the rest of the column by noting B6 was Relative, and C4 was No Change.) In cell C7, the expression is:

@IF(B7 = C4,@TRUE,0)

Looking down column C, you will find TRUE displayed in row 10. All other rows will have the value of zero. Even though it may be difficult to tell from Table 1, the value stored in cell C4 is 402130315. Take my word for it. The value displayed in cell C4 is 4.02E8 —values wider than the column width are automatically displayed using scientific notation if sufficient room is found. Other social security numbers can easily be entered into cell C4. A press of the !-recalculate button and another person is found.

Two points should be made. First, all statements which use an @IF function require you to enter values, not labels. That's why we entered SS#s as values. Second, using a series of @IF statements can make it quite easy to find any value. Finding students who only reported their SS# number and did not place their name on the test is easy when you use such functions as @TRUE, 0, or @FALSE.

You are not always going to need to display the data stored in column C. That is, you may wish to hide these values so that when you print the table the values are not displayed. There are several ways to accomplish this. The easiest way is to reset the column width—using the /Length command—to zero. This will make all of column C disappear. Don't worry, you didn't loose it. You can get THE Spreadsheet to display column C again by using the GOTO command, > , entering C1, and pressing return. Then, enter the /Length command, enter D for default, and press return. You will get everything back the way it was.

Keeping the Running Average

In column K, we use the expression:

@ AVERAGE(D6. . . J6)

This supplies a running average grade for each student since the expression is /Reproduced in column K, from row 6 through 37, answering Relative to all queries. Nothing really new here.

One colleague did ask how he might drop the lowest test score and then compute

Table 1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	GRADE TEMPLATE MASTER														Comp.	Space		COMPUTING ESTIMATED GRADES			
2	==========														==========			==========			
3	Name	SS	Search#	TEST	TEST	TEST	TEST	TEST	PAPER	FINAL	PTS	GRADE			TEST #	(x-m)^2					
4		NUMBER	4.02E8	1	2	3	4	5	6	7	8				8			New Test # =	3		
5	----------														----------				Mean is	76.176	
6	Last Name, First Name MI	421902670	0	88	95	82					88.33	3 0=F			88.333	158.34			St.D is	12.839	
7	Last Name, First Name MI	261713402	0	58		75					66.50	2 1=D			66.5	85.563					
8	Last Name, First Name MI	264943278	0	78	60	65					67.67	2 2=C			67.667	65.340		Missed Tst #=	2		
9	Last Name, First Name MI	264532876	0	70	72	71					71.00	2 3=B			71	22.562			Mean is	74.882	
10	Last Name, First Name MI	402130315	TRUE	75	60	75					70.00	2 4=A			70	33.063			St.D is	11.985	
11	Last Name, First Name MI	999902369	0	89	65	94					82.67	2			82.667	47.840					
12	Last Name, First Name MI	261869360	0	65	75	80					73.33	2			73.333	5.8403		New Score =	75		
13	Last Name, First Name MI	264439356	0	65	85	85					78.33	2			78.333	6.6736					
14	Last Name, First Name MI	266698800	0	80	60	60					66.67	2			66.667	82.507		Estimated Score is =>	73.784		
15	Last Name, First Name MI	262579869	0	65	75	80					73.33	2			73.333	5.8403					
16																		----------			
17																					
18																					
19																					
20																					
21																					
22																					
23																					
24																					
25																					
26																					
27																					
28																					
29																					
30	Last Name, First Name MI	418047446	0	55	95	88					79.33	2			79.333	12.840					
31	Last Name, First Name MI	262818237	0	68	65	63					65.33	1			65.333	108.51					
32	Last Name, First Name MI	262655847	0	75	78	75					76.00	2			76	.06250					
33	Last Name, First Name MI	264731188	0	75	65	62					67.33	2			67.333	70.840					
34	Last Name, First Name MI	263310017	0	90	80	92					87.33	3			87.333	134.17					
35	Last Name, First Name MI	264557807	0	95	85						90.00	3			90	203.06					
36	Last Name, First Name MI	267405249	0	80	65	50					65.00	1			65	115.56					
37	Last Name, First Name MI	265687168	0	95	93	98					95.33	4			95.333	383.51					
38	----------														----------						
39		SUMMARY STATS																			
40		Possible pts.		100	100	100	100	100	100	100	100										
41		Count		18	17	17	0	0	0	0	18				18			Look-up Table			
42		Min		55	60	50	0	0	0	0	65				65			----------			
43		Max		95	95	98	0	0	0	0	95.333				95.333			0	0	F	
44		Range		40	35	48	0	0	0	0	30.333				30.333			57.238	1	D	
45		Orig. Average		75.889	74.882	76.176	0	0	0	0	75.750				75.750	1542.1		66.494	2	C	
46		Variance		138.77	143.63	164.85										85.674		85.006	3	B	
47		St. Deviation		11.780	11.985	12.839	0	0	0	0	0					9.2560		94.262	4	A	
48		New Average		75.889	74.882	76.176	0	0	0	0	75.750										
49	==========																				
50																					
51	PEOPLE WHO HAVE DROPPED																				
52																					
53	Last Name, First Name MI	580065091	0								0										
54	Last Name, First Name MI	263579869	0								0										
55																					

the average. I found this an interesting question for several reasons. First, it provides an opportunity to use several functions within the same cell expression. Second, it points out one of the differences between THE Spreadsheet version 2.173 or later and earlier versions. This difference involves the use of the @MINimum function. When used in earlier versions, the @MINimum function would return a value of 0 whenever it encountered a blank in a series of referenced cells. Newer versions ignore blanks and return only the lowest valid value. So, make sure that you check the version you are using with the /Version command when the worksheet appears.

Now, to return to our problem. We can have THE Spreadsheet calculate the average grade across several tests by using the following functions (e.g., for row 6):

@SUM(D6...J6)-@MIN(D6...J6)/(@COUNT(D6...J6)-1)

That is, after SUMming all the test scores for this student, find the lowest test score and subtract it from the overall sum. Then, after determining the number of valid entries, subtract 1, and then divide this value into the modified sum. You now have the average for that student without including his/her lowest score.

Of course, if you were using THE Spreadsheet to summarize gymnastic or diving competition scores, you could use the expression:

@SUM (D6...J6)-@MIN(D6...J6)

-@MAX (D6...J6)/(@COUNT (D6...J6)-2)

In the classroom, however, students might get somewhat upset if you dropped their highest score. In any case, you will want to make sure that you have at least one more test score than the number of tests you delete when computing the running average.

Summary Stats: What the Truth Was and Is

The summarizing of student scores is just like any other data set. You are likely to have missing observations—not every student takes every exam nor does every respondent to a survey answer every question. In either case, summary statistics are easily computed since the functions of @COUNT, MINimum, MAXimum, and AVERAGE ignore blank cells. Therefore, for test 1, column D, the following expressions could be used:

Expression	Cell
@COUNT(D6...D38)	T2D41
@MIN(D6...D38)	D42
2MAX(D6...D38)	D43
@AVERAGE(D6...D38)	D45 & D48

Of course, you could easily /Reproduce

these summary statistics with the command /R, D41...D48:E41...K41, Relative. This command will place all these functions at the bottom of each column and give you a quick way to summarize the test results.

Now to answer an earlier question: How to handle summary statistics when you wish to have original data (those who took the test on time), and new data (those who took make-up exams or whose grades are estimated from some other source). Well, here's one solution. After you enter all the grades for those students who took the exam on time, press the !, recalculate command. Then place the marker in the cell you wish to remain stable, say cell D45—the original average value for test 1. Enter #, the pound sign. The display box will indicate the numeric value of the average function. A press of the RETURN key will replace the formula with the numeric value. By replacing only those functions that you wish to keep stable, e.g., cell D45, and not changing the same function in another cell, e.g., cell D48, adding values for missing observations will only change those cells that still have the original functions, e.g., cell D48. If you wish to keep the original values for other summary statistics, I suggest that you /Reproduce the function in another cell. This way you can keep track of original values as well as note the impact of changing a grade or entering a grade for students who missed the examination. (By the way, if you use the expression,

@IF(D41<>0,@AVERAGE (D6...D38),0)

you will not get an ERROR message when you have no test results. Rather, a zero will be displayed.)

Using the CHOOSE Function

In the previous articles I showed how you can use THE Spreadsheet to compute variance and standard deviation. I also showed how such statistics could be used for assigning grades as well as estimating a student's test grade from knowledge of his or her performance on a later examination. In addition to the use of appropriate formulae, I recommended that you use the /Reproduce command to copy the column of data (e.g., test 1 data), and then compute the sum of squared deviations in an adjacent column. For those who don't often use THE Spreadsheet, the /Reproduce command is one of those that cause considerable trouble.

Well, here's an alternative. We can carefully use the @CHOOSE command to automatically "reproduce" the data of any cell. The format of the choose command is straightforward:

@CHOOSE(value,list)

For example, using cell O6, the expression:

@CHOOSE(O4,D6...K6)

will allow us to have THE Spreadsheet automatically place the test data for student number 1 in cell O6 as long as we identify the test number in cell O4. Look at Table 2, which illustrates the use of the @CHOOSE function. See column O. By /Reproducing the CHOOSE function for each student, all cells with valid values will be transferred.

While it may not be apparent from the example used, there is a potential problem when using the CHOOSE function. That is, if the referenced cell is blank or has a label in it, the CHOOSE function will return a value of 0. Since you know this to be true, then the summary statistics functions might return an invalid value. I have, therefore, used additional CHOOSE statements in rows 41 through 45 rather than the more traditional approach (e.g., @AVERAGE(O6...O37), etc.).

By the way, this approach will insure that the computations of the sum of squares, column P, is computed using the correct average value. Simple addition, using the @SUM function in cell P45 and division in cell P46, produces the value for the variance. Cell P46 displays the value for the standard deviation. All these values are

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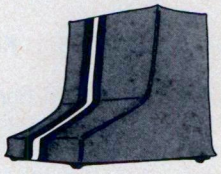

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automatically tabulated for each test by simply changing the test number, values 1 through 8, in cell O4. Now, if you have set the recalculation function to manual, a simple press of the ! key will tabulate these essential statistics.

One nice serendipitous outcome from this procedure is the ease with which these mean and standard deviation values can be linked to a look-up table. This is accomplished in columns R and S, rows 43 through 47. The formulae presented use the concept of the normal curve and return several values which are then used to link reference values. (You could have just as easily entered constants, e.g., 60, 70, 80, and 90 in column R.) Once computed, a second press of the ! (recalculate) command will automatically transfer a number grade (values from 0 through 4) to each student in column L. That is, in column L, the basic formula (at least for the first student) is:

@LOOKUP(K6,R43...R47)

Check Table 1 for the values. Remember that since we are doing "foward referencing"—referencing cells which have yet to compute new values, we will usually need to press the recalculation key twice in order to get the correct results.

Now, let's return to the CHOOSE function and answer the last faculty question about how to set up a section of the template for easily estimating missed exams grades. We'll use columns R through U, rows 1 through 15 for this purpose. (See Table 1 for a worked example and Table 2 for the equations.) All the user must do is to enter the current test number, cell T3, missed test number, cell T8, and the student's score on the most recent exam, cell T12. Each of these values are used. First, the value stored in cell T3 is reference with the command:

@CHOOSE(T4,D45...J45)

This returns the current mean value. The standard deviation of the new test, as well as the mean and standard deviation of the missed previous test are returned in similar manner. See Table 2. The formula stored in cell U14 computes an estimate of the grade the student would have made if he/she did as well on the missed exam as he/she did on the current exam.

You can easily use this section of the template for a large number of grade assignments. By splitting the window, you can keep this section of the template on the screen and easily move down a pair of columns of test values, then change just the new test value, cell T12, for each student who missed an exam, and key the estimated result by placing the marker in the missing cell and entering +U14#.

You say that you don't know how to use the /Window command. Okay, next time I'll have a new application and also cover working with windows. See you then.

Table 2

	N	O	P	Q	R	S	T	U
1		Comp.	Space		COMPUTI	NG ESTI	MATED G	RADES
2		=======	=======		=======	=======	=======	=======
3		TEST #	(x-m)^2					
4		8			New Tes t # =		3	
5		----------	-------				Mean is	@CHOOSE(T4,D45...J45)
6		@CHOOSE(O4,D6...K6)	@IF(O6<>0,(O6-O45)^2,0)				St.D is	@CHOOSE(T4,D47...J47)
7		@CHOOSE(O4,D7...K7)	@IF(O7<>0,(O7-O45)^2,0)					
8		@CHOOSE(O4,D8...K8)	@IF(O8<>0,(O8-O45)^2,0)		Missed Tst #=		2	
9		@CHOOSE(O4,D9...K9)	@IF(O9<>0,(O9-O45)^2,0)				Mean is	@CHOOSE(T8,D45...J45)
10		@CHOOSE(O4,D10...K10)	@IF(O10<>0,(O10-O45)^2,0)				St.D is	@CHOOSE(T8,D47...J47)
11		@CHOOSE(O4,D11...K11)	@IF(O11<>0,(O11-O45)^2,0)					
12		@CHOOSE(O4,D12...K12)	@IF(O12<>0,(O12-O45)^2,0)		New Sco re =		75	
13		@CHOOSE(O4,D13...K13)	@IF(O13<>0,(O13-O45)^2,0)					
14		@CHOOSE(O4,D14...K14)	@IF(O14<>0,(O14-O45)^2,0)		Estimat ed Scor e is =>			(((T12-U5)/U6)*U10+U9)
15		@CHOOSE(O4,D15...K15)	@IF(O15<>0,(O15-O45)^2,0)					
16		@CHOOSE(O4,D16...K16)	@IF(O16<>0,(O16-O45)^2,0)		-------	-------	-------	-------
\\								
\\								
\\								
30		@CHOOSE(O4,D30...K30)	@IF(O30<>0,(O30-O45)^2,0)					
31		@CHOOSE(O4,D31...K31)	@IF(O31<>0,(O31-O45)^2,0)					
32		@CHOOSE(O4,D32...K32)	@IF(O32<>0,(O32-O45)^2,0)					
33		@CHOOSE(O4,D33...K33)	@IF(O33<>0,(O33-O45)^2,0)					
34		@CHOOSE(O4,D34...K34)	@IF(O34<>0,(O34-O45)^2,0)					
35		@CHOOSE(O4,D35...K35)	@IF(O35<>0,(O35-O45)^2,0)					
36		@CHOOSE(O4,D36...K36)	@IF(O36<>0,(O36-O45)^2,0)					
37		@CHOOSE(O4,D37...K37)	@IF(O37<>0,(O37-O45)^2,0)					
38		-------	-------					
39						R	S	T
40								
41		@CHOOSE(O4,D41...K41)				Look-up	Table	
42		@CHOOSE(O4,D44...K42)				-------	-------	-------
43		@CHOOSE(O4,D43...K43)				0	0	F
44		@CHOOSE(O4,D44...K44)				+O45-(2*P47)	1	D
45		@CHOOSE(O4,D45...K45)	@SUM(P5...P38)			+O45-P47	2	C
46			+P45/O41			+O45+P47	3	B
47			@SQRT(P46)			+O45+(2*P47)	4	A
\\								
\\								
\\								

The Graphics Toolkit—Part 5:
Getting Ready for Screen Animation

Randi J. Rost

SO FAR in this series we have discussed the organization of the Apple II's graphics memory and developed some routines to draw points and lines, erase the screen, and perform some simple special effects. We now set our sights a little higher. How do we go about developing graphics routines that would be useful for animation?

Ultimate Speed

Before beginning our quest for animation-caliber graphics routines, we must clarify our needs. It should be obvious that one of the most important goals must be speed. The faster we can draw shapes on the screen, the longer we can spend calculating trajectories, collisions, and bookkeeping while still maintaining smooth, flicker-free motion.

Another feature of the finished routines should be flexibility. We may be willing to sacrifice a bit of speed if the graphics routines we develop can handle all of our shape-drawing needs. In addition, we'll continue to strive toward keeping our routines compact so more of the Apple's memory can be devoted to the graphics application.

Shape-Drawing Algorithms

One way to draw a shape on a graphics device is to develop an algorithm for drawing that shape. This is how lines, circles, rectangles and other simple shapes are drawn. We have even implemented some shape-drawing algorithms in previous installments of this series.

The shape-drawing facility provided in Applesoft is an algorithm that unpacks shape descriptions (shape tables) and draws them by executing the appropriate sequence of "move" and "draw line" instructions. One advantage of this method is that the shapes can be stored in a relatively compact form. Also, since the shape is composed entirely of vectors, the shape can be scaled or rotated easily. The disadvantages are that a shape can be just one color, and the drawing process is slow. Because of speed considerations, we must come up with something better.

Bitblts

A very common operation in computer graphics copying data values from one location in memory to another, potentially displayable, area. This is called a "bitblt," or bit block transfer operation. Many processors provide a special instruction for moving blocks of memory around.

This block transfer instruction can be used to draw shapes on the screen quickly and efficiently. A shape is stored in some area of memory that is not being displayed and the bitblt operation is used to quickly copy it into memory that is being displayed. The shape can be a rectangle of any size and potentially be any data values (colors) that are allowed. This type of shape has been used often in games on the Apple II and is sometimes referred to as a 'block shape'.

Because the Apple's 6502 processor has no block transfer instruction, we'll have to develop a machine language routine to simulate it. This bitblt routine will form the basis for our shape-drawing routines. Since the bitblt operation is essentially a memory copy, we will be copying bytes of data from our shape table to the graphics memory of the Apple. Obviously our shapes will take up more space this way, but we will be able to draw them rapidly. We will have some problems because of the Apple's graphics memory organization however.

Recall that information about seven pixels plus a color flag is stored in each byte of the Apple's graphics memory. Our shapes will have to contain the exact data values needed to display seven pixels on the screen in the fashion desired.

Home Movies

We wish to animate an object across the screen. As it moves, we'd like to show it's legs moving, it's antennae wobbling and its eyes rolling about in their sockets. Ideally, we'd like to develop an animation sequence—a series of still frames, that when displayed quickly enough in sequential locations on the screen, promotes the illusion of motion. In theory, this sequence could be as long as desired—enough frames to complete the desired animation cycle. The cycle could be repeated many times as the shape moved about on the screen in any direction.

How do we do this on the Apple? Once we have defined a shape, we can move it vertically on the screen with no problem. We'll designate the upper left corner of the shape as the origin of the shape. Simply changing the y-coordinate of the origin will cause it to be drawn at any vertical location. We should be able to use our YTABLE to efficiently calculate the addresses in memory where the shape is to be drawn. We could even define an animation sequence of any number of frames, and select each of these frames in turn as the object is moved vertically up or down on the screen.

Things become confusing when we discuss horizontal motion. Suppose we restrict ourselves to byte boundaries in selecting the horizontal position on the screen. Our mouths drop open in disbelief when our shape comes out in different colors, depending on whether the starting byte address was even or odd! To see that this is so, try this: type HGR from Applesoft followed by a POKE 8192,85 and a POKE 8193,85. You POKEd the same value into two consecutive bytes of memory, but in the first case it came out green and in the second case it came out violet!

This is the nature of the beast we must deal with. One possible solution to this problem would be to require shapes to begin on *even* byte boundaries. This restriction, however, will not promote flicker-free graphics, so we

must find ways to make it palatable.

One thing we can do is provide several versions of a particular shape, each shifted horizontally by a certain amount. The block shape itself will begin on an even byte boundary, but pixel data within the block may be shifted horizontally. Because of the even/odd column dilemma, let's make that "certain amount" be two pixels. This will assure that the shape will remain a constant color as it is shifted horizontally. Because of our earlier discussion, we know that a given shape will appear exactly the same if it is moved over two bytes. We therefore need only to take care of shifting a shape through two bytes. Two bytes equals 14 pixels and since we'll shift by two pixels each time, we'll need seven different frames for the animation sequence.

Pixels shifted out of one byte must be shifted into the adjacent byte. The color flag (high bit) of each byte must also be maintained. It is clear that shifting pixels in and out of the data bytes on the fly will be time-consuming. We'll have to settle for shifting the shapes ahead of time and storing the different pre-shifted shapes in our shape table. Then, to draw our shape at 0,0 we'd use frame #1 of the sequence. To draw it at 0,2 we'd use frame #2, at 0,4 we'd use frame #3, and so on. When we got to 0,14 we'd shift our starting horizontal position over two bytes and use frame #0 again.

This all sounds pretty confusing! Instead of one shape, we need seven. We can specify any value for the y-coordinate, but we can only use x-coordinates that fall on the left boundary of even numbered bytes! Have no fear! We'll develop our shape-drawing routines so that the proper frame of the seven in the sequence will be chosen automatically, and given a shape and an x,y-coordinate on the Apple's screen. This discussion will help you to understand why shapes must be the way they are, and why our shape-drawing routines operate as they do.

The Shape Table

Making our shape tables completely relocatable is another must. This will allow us to put shape tables anywhere in memory and to have multiple shape tables in memory. We'll utilize the same page zero locations to point to our current shape table as Applesoft uses. We can then place the table anywhere in memory since we'll always have a pointer to it in a fixed location.

We'll start the shape table by allocating space for an offset to the next available byte of memory following the shape table. This way we can add shapes to existing tables. The number of shapes supported by the table must also be provided. We'll use offsets to shapes and to frames within shapes so that the tables remain completely relocatable, yet we can get to the start of any frame of any shape quickly.

Making Shapes

This month, we'll look at a fairly simple Applesoft program that will let you turn shapes on the hi-res screen into an "animation shape table" of the type we've been discussing. This program will let you specify a rectangular region of the screen and will automatically expand it to the nearest whole byte boundary and compute the six additional shifted shapes.

The shape table generator program is shown in Listing 1. I call this program "MAT" for Make Animation Tables. MAT lets you use the game paddles to define a region of the hi-res graphics screen to turn into a shape.

MAT starts out by poking a simple Applesoft shape table into memory. This shape table contains the cursor shapes to be used in defining the region of a shape. Hi-res graphics are turned on without erasing the current contents of the screen. Next, an array is computed that contains the address of the first byte of every row in hi-res graphics memory page one. This array will act as a look-up table and speed up calculations which compute the shifted shapes.

When you enter the program, you'll be asked if you'll be using an old table. If you respond affirmatively, you will be prompted for the name of the shape table and it will be loaded from the disk. If not, a new shape table will be created in memory and you will be asked for a maximum number of shapes that the table may contain.

There are five main options available. If you enter the program with something on the hi-res screen, select the first option and adjust the cursors using the game paddles. Use the knobs to adjust the horizontal and vertical position of one of the cursors. Press one of the pushbuttons to switch to the other cursor. When the shape has been defined by using the paddles, press a key to return to the menu. In general you'll want to leave two bytes (14 pixels) to the right of the shape to allow room for the shifted shapes.

Once the shape boundaries have been adjusted using the paddles, you can select option #2 to compute the shape and its shifted versions and add them to the shape table. If you want, you can use option #3 to load a hi-res screen that's been saved on disk to provide more shape-making material. You can use option #4 at any time to save the shape table on the disk.

Option #5 can be used once you become adept at making shape tables. It allows you to create shapes a single frame at a time. You must take care of the shifting yourself by positioning the object and the cursors properly. This allows you to add extra motion such as swinging arms, rolling eyes or changing colors to the animation sequence.

A Finished Product

Listing 2 is a hex dump of a shape table created by MAT. The shape is a white rectangle (HCOLOR = 3) from 0,0 to 6,7. Let's take a close look at the values in the shape table in order to see exactly how it's organized.

The first two bytes are the offset to the next available memory location. Adding the offset ($00CF) to the start of the table ($6000) gives us the address $60CF which contains a zero. If we choose to add shapes to this table later on, the next one will start at location $60CF.

The next byte contains the number of shapes in the table. In addition, the high bit of this byte is set so that this type of shape table can be distinguished from another, very similar shape table that we'll be discussing later on in this series. The number of shapes is never needed by the machine language routines, only (potentially) by utility programs that create, edit, copy, and merge these tables. In this case, the shape table contains space for ten shapes, and the high bit of this byte set to one uniquely identifies this as an animation shape table.

Adding three to the start address of the shape table gets us to the offset for the first shape in the table. This is also a two-byte offset, in this case $0014. Adding this offset to the current address ($6003) gives us the address ($6017) of the actual data for shape #1. Following the two-byte offset for shape #1 are nine pairs of zero bytes, indicating that shapes 2-10 are currently undefined.

Starting at location $6017 we see two bytes that indicate that this shape is three bytes wide and eight pixels high. Seven sets of two-byte offset

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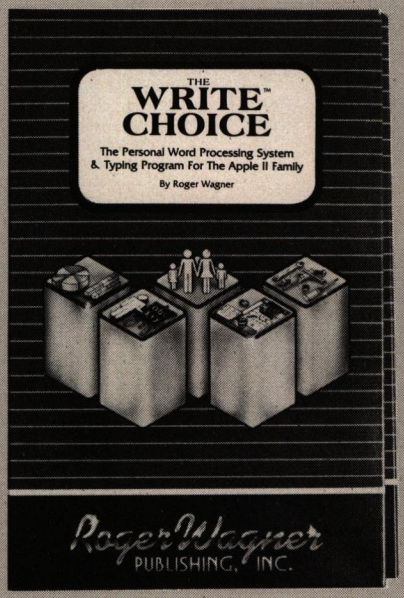

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"All the News That Fits"

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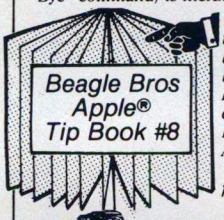

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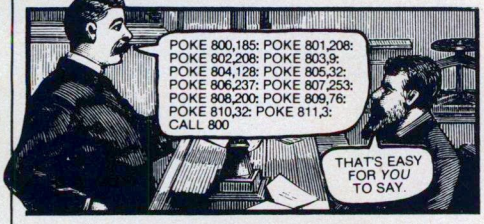
POKE 800,185: POKE 801,208:
POKE 802,208: POKE 803,9:
POKE 804,128: POKE 805,32:
POKE 806,237: POKE 807,253:
POKE 808,200: POKE 809,76:
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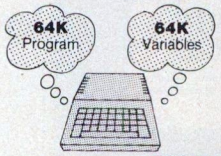

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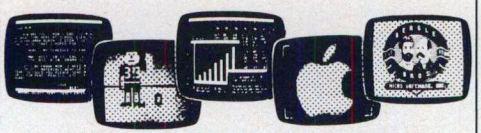

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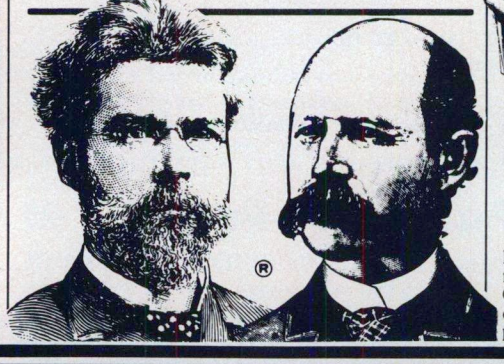

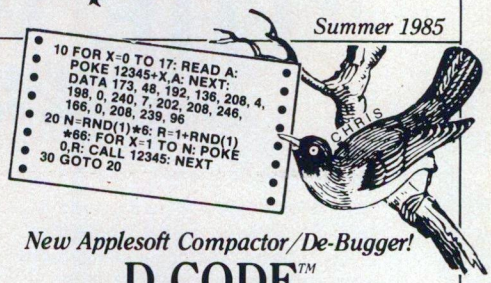

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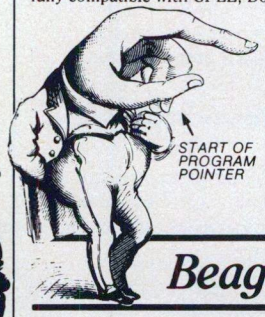


```
1  HOME: HTAB 5: POKE
   33,28: FOR C=1 TO 92:
   POKE 50,255-192*
   (C=4 OR C=64)
9  J=J+1-31*(J=31):
   PRINT CHR$(9+(J=1));
   SPC(2+(J<10))J;:
   NEXT: PRINT
85 POKE 33,1: PRINT
   "JULY..AUG..SEPT...."
```

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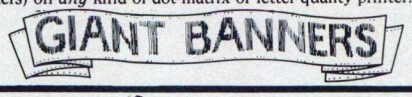

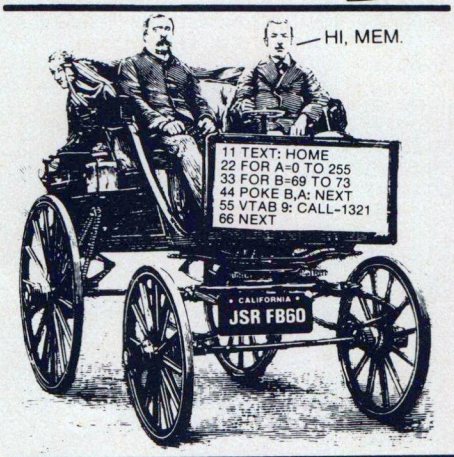

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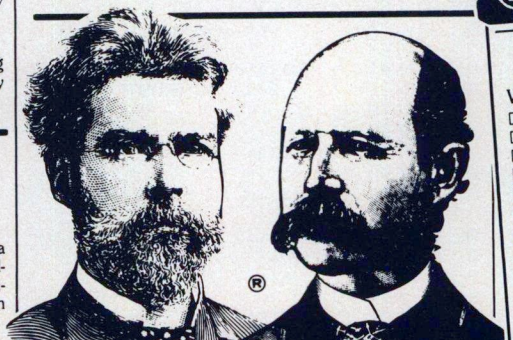

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Listing 1

```
90  REM  MAKE ANIMATION TABLES
91  REM
92  REM     BY RANDI J. ROST
93  REM
100  REM
101  REM  *****   INITIALIZATION
       *****
105  DIM Y(192)
110  FOR I = 768 TO 794
120  READ SHAPE: POKE I,SHAPE: NEXT
     I
130  DATA  2,0,9,0,18,0,26,0,0,45
     ,45,45,222,219
135  DATA  51,54,6,0,63,63,63,76,
     73,33,36,4,0
140  POKE 232,0: POKE 233,3
150  ROT= 0: SCALE= 1
160  HOME : VTAB 22
170  POKE  - 16297,0: POKE  - 163
     04,0
175  POKE  - 16301,0: POKE 33,40
180  FOR I = 0 TO 191
185 TO =  INT (I / 8)
186 TO = TO -  INT (TO / 8) * 8
190 T1 = I -  INT (I / 8) * 8
200 T2 =  INT (TO / 8)
210 Y(I) = 8192 + T1 * 1024 + TO *
     128 + T2 * 40
220  NEXT I
490  HOME : VTAB 24
500  INPUT "WILL YOU BE USING AN
     OLD TABLE?";A$
510  IF  LEFT$ (A$,1) = "Y" THEN
     700
520 START = 16384
525  HOME : VTAB 24
530  INPUT "INPUT MAX # OF SHAPES
      FOR TABLE?";NUM
540  POKE START + 2,NUM + 128
550  FOR I = START + 3 TO START +
     2 + 2 * NUM: POKE I,0: NEXT
     I
560 AVAIL = I: GOTO 900
700  INPUT "TYPE IN NAME OF OLD T
     ABLE?";N$
710  PRINT  CHR$ (4);"BLOAD ";N$
720 START =  PEEK (43634) + 256 *
      PEEK (43635)
730 AVAIL =  PEEK (START) + 256 *
      PEEK (START + 1) + START
900  REM  *****   MAIN MENU   ***
     **
1000  HOME : VTAB 24
1010  PRINT "1) ADJUST CURSORS  2
     ) GENERATE SHAPE"
1020  PRINT "3) LOAD HGR SCREEN 4
     ) SAVE TABLE"
1025  PRINT "5) GENERATE A SINGLE
      FRAME OF A SHAPE"
1030  INPUT "ENTER WHICH?";A$
1040 T =  VAL (A$)
1045  PRINT
1050  ON T GOSUB 9000,8000,7000,6
     000,5000
1060  GOTO 1000
5000  REM  *****   GENERATE A FRA
     ME   *****
5008  HOME : VTAB 22
5010  INPUT "WHICH SHAPE NUMBER W
     ILL THIS BE?";SN
5020 A1 = START + SN * 2 + 1
5030 T1 =  PEEK (A1):T2 =  PEEK (
     A1 + 1)
5040  IF T1 <  > 0 OR T2 <  > 0 THEN
     5100
5050 T = AVAIL - A1
5060  POKE A1,T -  INT (T / 256) *
     256: POKE A1 + 1, INT (T / 2
     56)
5070 WIDTH =  INT ((X2 - X1) / 7)
      + 1: POKE AVAIL,WIDTH
5080 HEIGHT = Y2 - Y1 + 1: POKE A
     VAIL + 1,HEIGHT
5085 AVAIL = AVAIL + 2
5090  FOR I = AVAIL TO AVAIL + 13
     : POKE I,0: NEXT I:A1 = AVAI
     L:AVAIL = I: GOTO 5200
5100 A1 = A1 + T1 + T2 * 256:WIDT
     H =  PEEK (A1):HEIGHT =  PEEK
     (A1 + 1):A1 = A1 + 2
5200  INPUT "WHICH SEQ # WILL THI
     S BE?";SEQ
5210 T = A1 + (SEQ - 1) * 2
5220 T3 = AVAIL - T:T1 = T3 -  INT
     (T3 / 256) * 256:T2 =  INT (
     T3 / 256)
5230  POKE T,T1: POKE T + 1,T2
5240  FOR I = Y1 TO Y1 + HEIGHT -
     1
5250  FOR J =  INT (X1 / 7) TO  INT
     (X1 / 7) + WIDTH - 1
5260 T =  PEEK (Y(I) + J)
5270  POKE AVAIL,T
5280 AVAIL = AVAIL + 1
5290  NEXT J,I
5300  RETURN
6000  REM  *****   SAVE SHAPE TAB
     LE   *****
6010 T = AVAIL - START
6030  POKE START,T -  INT (T / 25
     6) * 256: POKE START + 1, INT
     (T / 256)
6035  HOME : VTAB 22
6040  INPUT "INPUT NAME FOR TABLE
     ?";N$
6050  PRINT  CHR$ (4);"BSAVE ";N$
     ;",A";START;",L";AVAIL - STA
     RT + 2
6060  RETURN
7000  REM  *****   LOAD HI-RES SC
     REEN   *****
7005  HOME : VTAB 22
7010  INPUT "INPUT NAME OF SCREEN
      TO LOAD?";N$
7020  PRINT  CHR$ (4);"BLOAD ";N$
     ;",A$2000"
7030  RETURN
8000  REM  *****   GENERATE ENTIR
     E SHAPE SEQUENCE   *****
8010  HOME : VTAB 22
8020  INPUT "WHICH SHAPE NUMBER W
     ILL THIS BE?";SN
8030 A1 = START + SN * 2 + 1
8040 T1 =  PEEK (A1):T2 =  PEEK (
     A1 + 1)
8050  IF T1 <  > 0 OR T2 <  > 0 THEN
      PRINT "SHAPE ALREADY DEFINE
     D...": GOTO 8020
8060 T = AVAIL - A1
8070  POKE A1,T -  INT (T / 256) *
     256: POKE A1 + 1, INT (T / 2
     56)
8080 WIDTH =  INT ((X2 - X1) / 7)
      + 1: POKE AVAIL,WIDTH
8090 HEIGHT = Y2 - Y1 + 1: POKE A
     VAIL + 1,HEIGHT
8100 AVAIL = AVAIL + 2
8110 B(1) = AVAIL + 14
8120  FOR I = 1 TO 7
8130 T = B(I) - AVAIL
8140  POKE AVAIL,T -  INT (T / 25
     6) * 256: POKE AVAIL + 1, INT
     (T / 256)
8150 AVAIL = AVAIL + 2
8160 B(I + 1) = B(I) + HEIGHT * W
     IDTH
8170  NEXT I
8180 X3 =  INT (X1 / 7)
8190  FOR I = Y1 TO Y2
8200  FOR J = X3 TO X3 + WIDTH -
     1
8210 T =  PEEK (Y(I) + J)
8230  POKE AVAIL,T
8240 AVAIL = AVAIL + 1
8250  NEXT J,I
8260  FOR I = 2 TO 7
8270  FOR J = 0 TO HEIGHT - 1
8280 FLAG = 0:RMDR = 0
8290  FOR K = B(I - 1) + J * WIDT
     H TO B(I - 1) + J * WIDTH +
     WIDTH - 1
8300 T =  PEEK (K)
8310  IF T > 127 THEN T = T - 128
     :FLAG = 1
8320 T1 = T * 4 -  INT ((T * 4) /
     128) * 128
8330 T2 =  INT ((T * 4) / 128)
8340 T1 = T1 + RMDR
8350 RMDR = T2
8360  IF FLAG = 1 THEN T1 = T1 +
     128
8370  POKE AVAIL,T1
8380 AVAIL = AVAIL + 1
8390  NEXT K,J,I
8400  RETURN
9000  REM  *****   ADJUST CURSORS
       *****
9010 T = 0: HOME
9011 X1 =  INT ( PDL (0) * 279 /
     255):X2 = X1 + 6: IF X2 > 27
     9 THEN X2 = 279
9012 Y1 =  INT ( PDL (1) * 191 /
     255):Y2 = Y1
9015 X7 = X1:Y7 = Y1:X8 = X2:Y8 =
     Y2
9020  XDRAW 1 AT X1,Y1
9030  XDRAW 2 AT X2,Y2
9040  IF  PEEK ( - 16287) > 127 THEN
     T =  NOT T
9050  IF  PEEK ( - 16286) > 127 THEN
     T =  NOT T
9060  IF  PEEK ( - 16384) > 127 THEN
      POKE  - 16368,0: XDRAW 1 AT
     X1,Y1: XDRAW 2 AT X2,Y2: RETURN

9070  IF T THEN X4 =  PDL (0):Y4 =
      PDL (1)
9080  IF  NOT T THEN X5 =  PDL (0
     ):Y5 =  PDL (1)
9085 X1 =  INT (X4 * 279 / 255):X
     2 =  INT (X5 * 279 / 255)
9086 Y1 =  INT (Y4 * 191 / 255):Y
     2 =  INT (Y5 * 191 / 255)
9090 T1$ = " ":T2$ = " "
9100 X1 =  INT (X1 / 7) * 7
9110 X2 =  INT (X2 / 7) * 7 + 6
9112  IF X2 > 279 THEN X2 = 279
9120  VTAB 22: PRINT "X1=";X1;"
     ";T1$;: HTAB 15: PRINT "Y1="
     ;Y1;"   "
9130  PRINT "X2=";X2;"  ";T2$;: HTAB
     15: PRINT "Y2=";Y2;"   "
9135  IF X7 <  > X1 OR Y7 <  > Y1
      THEN  XDRAW 1 AT X7,Y7:X7 =
     X1:Y7 = Y1: XDRAW 1 AT X1,Y1

9140  IF X8 <  > X2 OR Y8 <  > Y2
      THEN  XDRAW 2 AT X8,Y8:X8 =
     X2:Y8 = Y2: XDRAW 2 AT X2,Y2

9145  GOTO 9040
```

Listing 2

```
*6000.60CF

6000- CF 00 8A 14 00 00 00 00
6008- 00 00 00 00 00 00 00 00
6010- 00 00 00 00 00 00 00 03
6018- 08 0E 00 24 00 3A 00 50
6020- 00 66 00 7C 00 92 00 7F
6028- 00 00 7F 00 00 7F 00 00
6030- 7F 00 00 7F 00 00 7F 00
6038- 00 7F 00 00 7F 00 00 7C
6040- 03 00 7C 03 00 7C 03 00
6048- 7C 03 00 7C 03 00 7C 03
6050- 00 7C 03 00 7C 03 00 70
6058- 0F 00 70 0F 00 70 0F 00
6060- 70 0F 00 70 0F 00 70 0F
6068- 00 70 0F 00 70 0F 00 40
6070- 3F 00 40 3F 00 40 3F 00
6078- 40 3F 00 40 3F 00 40 3F
6080- 00 40 3F 00 40 3F 00 00
6088- 7E 01 00 7E 01 00 7E 01
6090- 00 7E 01 00 7E 01 00 7E
6098- 01 00 7E 01 00 7E 01 00
60A0- 78 07 00 78 07 00 78 07
60A8- 00 78 07 00 78 07 00 78
60B0- 07 00 78 07 00 78 07 00
60B8- 60 1F 00 60 1F 00 60 1F
60C0- 00 60 1F 00 60 1F 00 60
60C8- 1F 00 60 1F 00 60 1F 00
*
```

follow. These are used in accessing each of the seven frames of the shape. Since shapes can be any height and width, we'll avoid any time-consuming multiplications by storing the offsets to the data for each frame. A simple addition of the offset and the current

address gets us to the data for the desired frame.

For instance, assume we decide to draw frame #4 of shape #1. We get to location $601F and find our offset to be $0050. A simple addition leads us to the shape data which begins at location $606F. At that address we'll find eight sets of bytes that read "40 3F 00" corresponding to our original rectangle shape shifted over by six bits.

Making Your Own Shapes

For practice, try using the MAT program to create a shape table identical to that found in Listing 2. Write a little program that will draw a box with HCOLOR = 3 from 0,0 to 6,7. Run the program to draw the box on the screen and then run the program MAT.

You'll want to create a new shape table, so answer with "N" when asked if you'll be using an old table. Type 10 for the number of shapes this table will hold. Select the "ADJUST CURSOR" option from the menu and use the paddles to set x1 = 0, y1 = 0, x2 = 20, and y2 = 7. Press any key to get back to the main menu. Select the "GENERATE SHAPE" option and make this shape number one.

When the shape has been generated and the prompt returns, save the shape table to disk and use a ctrl–C to exit the program. BLOAD your table into a suitable location in memory ($6000 is fine) and compare it to Listing 2. The values should be identical.

Next Time

The shape we have created here is not very exciting, but we have laid the groundwork for some powerful machine language subroutines for animation. Next time we'll take a look at the routines to draw shapes of the sort described in this month's column. Between now and then, use your imagination and your shape table generator program and create some interesting shapes. After next time you'll be able to animate any of the shapes you develop!

If you have become completely lost by this month's discussion, don't worry. After developing the machine language routine to draw these shapes, the reasons for our shape table structure should become clear. We'll develop the routine so that you only need to pass the shape number and the actual x,y–coordinate at which it is to be drawn. All the dirty work will be handled by our shape table generator program and the assembly language drawing routines. Stay tuned!

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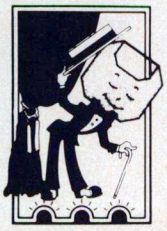

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A Bug in the ProDOS CHAIN Command

Peter Meyer

Whilst developing a large Applesoft/ProDOS application recently (using ProDOS Version 1.0.2, released 15-FEB-84) I came across a bug in the ProDOS **CHAIN** command. This bug occurs, on average, only once every 256 times during the course of program development. It is thus even worse than one of those now-you-see-it-now-you-don't bugs.

The following two Applesoft programs demonstrate the bug. Save this to disk with the filename **PART.A:**

```
10 X = 1
20 D$ = CHR$(4)
30 DIM A$(165)
40 PRINT D$"CHAIN PART.B"
```

Save this as **PART.B:**

```
10 IF NOT (D$ = CHR$(4) THEN LIST: STOP
20 PRINT "ALL OK"
```

Run **PART.A** and the message "All OK" will appear, showing that PART.B has been CHAINed with variables intact. Now load **PART.A**, delete line 10, and run it. Part.B will be chained, but the variable D$ no longer has its original value, and PART.B will stop at line 10.

The Detective Process

What's going on here? The obvious place (to me) to start to track down the bug was to check the values of the Applesoft variable pointers before and after the CHAIN command is executed. (There are a number of good sources for information on the internals of Applesoft.) The pointers themselves will have changed, since they depend on the length of the program being chained, but if the CHAIN command preserves the variables intact then the bytes which are pointed to should be the same.

The relevant Applesoft pointers are:

VARTAB	$69,6A	Pointer to start of the simple variables
ARYTAB	$6B,6C	Pointer to start of the array variables
STREND	$6D,6E	Pointer to the end of the variables

The bug manifests itself only when line 10 of PART.A is removed, so run the following program:

```
20 D$ = CHR$(4)
30 DIM A$(165)
40 Call -151
```

This will leave us in the Apple Monitor, with the Applesoft variable pointers as they are at the time the CHAIN command is executed. If you type "69.6E" the Monitor will respond with:

```
0069- 27 08 2E 08 27 0A
```

This gives us the following values for the Applesoft variables pointers:

```
VARTAB = $827
ARYTAB = $82E
STREND = $A27
```

The logical way to proceed in our bug-tracking is now:

1. Take a note of the first few bytes which are pointed to by VARTAB and ARYTAB.
2. Replace line 10 in **PART.B** with **CALL -151** and save this to disk as **PART.B**
3. Load **PART.A**, delete line 10 and run it.

When PART.B executes and drops into the monitor (CALL -151) again check the first few bytes pointed to by VARTAB and ARYTAB.

This shows us that the bytes pointed to by VARTAB and ARYTAB are different after the chain than they were before the chain. But this simply confirms that the variables are not being preserved by the CHAIN command, which we know anyway from line 10 of PART.B. It does not tell us what is causing the bug.

The clue lies in noting the unusual. In this case it is that the low byte of STREND is the same as the low byte of VARTAB (both before and after the chain). VARTAB and STREND are independent of each other so this is a chance occurence, only once in every 256 times. Could it be that the bug in the ProDOS CHAIN command occurs *only* when the low bytes of these two pointers are the same? The answer seems to be yes. I confirmed this by adding a variable (viz. X = 1 in PART.A) in order to cause the low byte of STREND to be different from the low byte of VARTAB.

Thus it seems that when the combined length of the simple variables and array variables (i.e. STREND minus VARTAB) is an exact multiple of 256, *the ProDOS CHAIN command fails to preserve the values of the variables*. Thus if you find your program crashing after a ProDOS CHAIN you can probably fix things simply by adding a dummy variable to the program using the CHAIN command.

Answers and Fixes

For program development to continue, it is enough to know the conditions under which a bug manifests itself, so as to avoid those conditions. We do not have to know exactly why the bug manifests under those conditions. But in this case I will hazard a guess.

The ProDOS CHAIN command first moves all the simple and array variables up in memory to just below the strings. It then loads in the new program and moves the variables back down to the end of the new program. Presumably the actual machine code in ProDOS which does this does not properly handle the case where the length of the bytes being moved is an exact multiple of 256. Assembly language programmers know that such oversights occasionally occur.

No doubt the bug can easily be eliminated, and one hopes that Apple will do so in a future release of ProDOS, which is generally a very fine operating system. If you find a program crashing after a ProDOS CHAIN you can probably fix things simply by adding a dummy variable to the program.

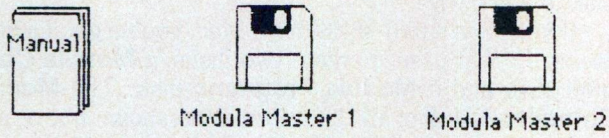
Modula-2 on the Mac

Product:	Mac Modula 2
Use:	Programming Language
For:	Macintosh
Company:	Modula Corp. 950 N. University Provo, UT 84604 (801) 375-7400
Availability:	Available through A.P.P.L.E. $150

Keith Bechard

What do you Get?

Ok, you've decided to fork out 150 bucks and take a chance on something called Mac-Modula-2. You place the order and wait desperately for the package to arrive. When you open it, you find:



That's right, you get a big, fat, 548 page manual and two disks. Like any self-respecting computer jock, you immediately power up the Mac and stick one of the disks in. Surprise, the disk will not boot! Better check that manual! Right there on page 4 it says:

> "Neither of the disks contains a copy of the Mac system. This means *you cannot boot the disk you received without a little rearrangement.*"

So sit back and read for a while. I will discuss what is in the manual and on the disks.

The well-written manual tells you how to use Mac-Modula-2, but not how to program in Modula-2. (If you want a reference source on the Modula-2 language, the manual recommends Niklaus Wirth's book, *Programming in MODULA-2.*) Examples and diagrams are plentiful and the text is very readable. There is also an excellent index. My only minor complaint is that the manual is a bound book, and does not lay flat like a loose leaf or wire-bound document.

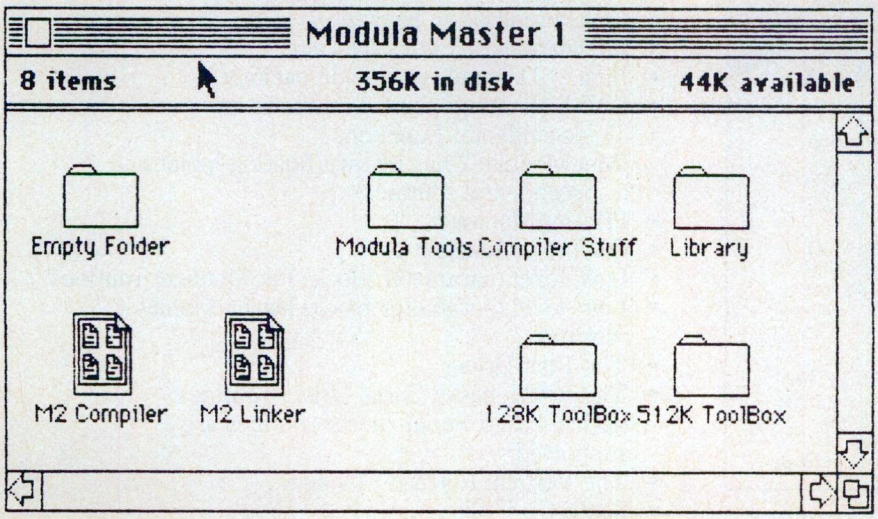
Now, what about those two disks? The following menu screens should give you an idea of what's included:

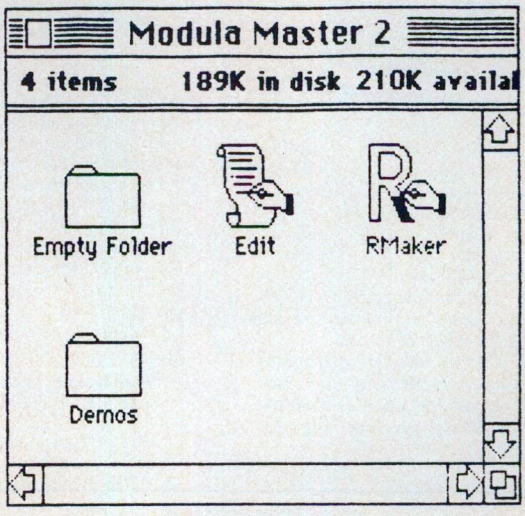
The **Modula Tools** folder contains the M-code interpreter that executes compiled and linked programs. **Compiler Stuff** contains the many passes of the compiler itself. **Library** contains the compiled definition and implementation modules. These are the library files from which you import procedures and variables. **M2 Compiler** is the compiler application itself. **M2 Linker** is the linker application. **128K Toolbox** and **512K Toolbox** contain the files for interfacing to the Macintosh Toolbox and Quickdraw. **Edit** is a pretty nifty full screen editor that allows you to edit multiple files at the same time. **RMaker** is the Resource Maker, which allows you to build resource descriptions of the applications you create with Modula-2. **Demos** contains samples of Modula-2 programming. These same examples are also listed in the manual.

How It Works

MacModula-2 has to be customized depending on the number of disk drives and the size of your Mac. In my opinion, the second disk drive is the most useful accessory. Even with a 128K Mac you can build a large application by using overlays, but if you only have one disk drive, you must constantly swap disks. I tried both one and two disks, and what follows are my recommendations (note that I have a 128K Mac).

For a single drive system, I first copied the system files to a new disk. I then copied a program called, "Desk Accessory Mover" (available on Compuserve). Using the Desk Accessory Mover (DAM), I removed all the desk accessories except the **Scrapbook** and the **Control Panel**. A normal system folder requires about 209K bytes. Removing the extra desk accessories and making sure the Scrapbook is empty reduces the size of the system folder to 105K. Once you've removed the desk accessories, you can delete the DAM. After building a minimum system disk, I made a copy of it. One disk I name **Modula Compiler**, the other I call **Modula Editor**.





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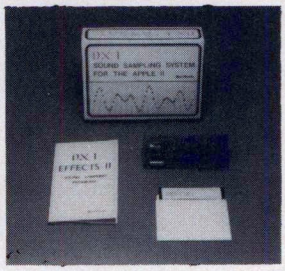

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Next the MacModula-2 files are copied as shown below:

Modula Compiler disk	Modula Editor disk
M2 Compiler (application)	Edit (application)
M2 Linker (application)	Code Procs (from 128K Toolbox folder)
Compiler Stuff (folder)	
128K Toolbox (folder, minus the Code Procs folder)	
Library (folder)	
Modula Tools (folder)	

After all that, we can finally do some real work!! Use the **Modula Editor** disk to create the source code files. Then copy them to the **Modula Compiler** disk. There, the source code can be compiled, linked and executed. Given this setup, you have about 69K on the **Modula Compiler** disk to work with.

If you have a two-disk-drive Mac, you've got it a little easier. In that case, I create two disks, a **Modula Compiler** disk and a **Modula Programs** disk. The **Modula Compiler** disk has all the information shown above and the Edit application. The **Modula Programs** disk has only the Code Procs folder. With this setup, all your Modula-2 programs are on the **Modula Programs** disk.

Getting Inside the Mac

Once our disks are built, we can get down to some serious programming. Now we need to start thinking about using the Mac's ROM routines. What's available and what's missing if we use MacModula-2? Well, the following Toolbox Manager routines are supported:

QuickDraw	**ClockManager**	**Package Manager**
ResourceManager	**FontManager**	**EventManager**
WindowManager	**ControlManager**	**MenuManager**
SerialDriver	**TextEdit**	**DialogManager**
DeskManager	**ScrapManager**	**ToolBoxMisc**
FileManager	**MemoryManager**	**DeviceManager**
Segment Loader	**SoundDriver**	

Whew!! With all that, what's missing? Frankly, it doesn't seem like a lot. The facilities that are currently not supported are mostly low level routines, such as those usually accessed by assembler. According to the MacModula-2 manual, the missing routines are:

- Installing custom QuickDraw routines
- Disk Initialization package
- International Utilities package
- Binary-Decimal conversion package
- SANE Floating-point Arithmetic and Transcendental Functions (MacModula-2 has its own floating-point and transcendental routines)
- PrintingManager
- OS EventManager
- Low-level (parameter block) FileManager routines
- Low-level (parameter block) DeviceManager routines
- The Disk Driver
- The RAM-based Serial Driver routines (ROM-based Serial Driver routines are supported)
- The Vertical Retrace Manager
- Some OS Utility routines

Thin vs. Fat

Now we come to the differences between a 128K and 512K Mac. A 128K Mac does not have enough memory for the compiler to access Toolbox definition and implementation modules. So MacModula-2 uses what is called **Code** procedures. An example of a code procedure is:

```
CONST
   MemoryManagerModNum = 18;
   CX = 355b;
PROCEDURE NewHandle (byteCount: Size) : Handle;
CODE CX; MemoryManagerModNum; 1 END NewHandle;
```

The above code is copied into the source module. When the MacModula-2 compiler encounters a reference to the procedure, it generates an M-code instruction to call an external procedure, i.e., the ROM routine. However, the source **Code** procedure files are provided and, using the editor, you can cut the **Code** procedures directly into your code. With a 512K Mac, all the Toolbox routines have definition and implementation modules. Clear as mud?? Well, an example should help. Listings 1 and 2 show the same program implemented for 128K and 512K Macs. It is a sample program that reads the system clock and prints out the time.

How Well Does It Work?

Although MacModula-2 is an interpreted language, the following statistics should show you that it has pretty

```
MODULE TimeDemo128;
(* Read the system clock and print the current
   time on the screen *)
(* The 128K Mac Version *)

FROM Terminal              IMPORT ClearScreen;
FROM InOut                 IMPORT WriteString,
                                  WriteInt, Write;
FROM ToolBoxTypes          IMPORT DateTimeRec;

VAR
  CurrentTime: DateTimeRec;

(* The following lines were cut directly from the
   CODE procs file for *)
(* the ClockManager.*)

CONST
    ClockManagerModNum      = 4;
    CX = 355b;

PROCEDURE GetTime(VAR date: DateTimeRec);
CODE CX; ClockManagerModNum; 5 END GetTime;

BEGIN
  ClearScreen;
  GetTime(CurrentTime);
  WriteString("The current time is: ");
  WriteInt(CurrentTime.hour,2);
  Write(":");
  WriteInt(CurrentTime.minute,2);
  Write(":");
  WriteInt(CurrentTime.second,2);
END TimeDemo128.
```


MacModula-2

- **Full Wirth Modula-2 Compiler**
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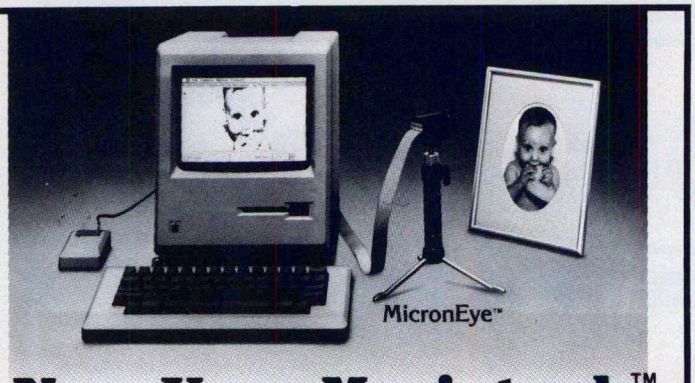
```
MODULE TimeDemo512;

(* Read the system clock and print the current
   time on the screen *)
(* The 512K Mac Version *)

FROM Terminal        IMPORT ClearScreen;
FROM InOut           IMPORT WriteString,
                            WriteInt, Write;
FROM ToolBoxTypes    IMPORT DateTimeRec;
FROM ClockManager    IMPORT GetTime; (* 512K
                            version allows
                            importation *)

VAR
  CurrentTime: DateTimeRec;

BEGIN
  ClearScreen;
  GetTime(CurrentTime);
  WriteString("The current time is: ");
  WriteInt(CurrentTime.hour,2);
  Write(":");
  WriteInt(CurrentTime.minute,2);
  Write(":");
  WriteInt(CurrentTime.second,2);
END TimeDemo512.
```

good performance. The benchmark I used is the old reliable, Sieve of Eratosthenes. The Sieve finds the primes in the first 8190 integers, and does it 10 successive times. The



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Circle 35 on Reader Service Card


```
MODULE Sieve;

(* Sieve of Eratosthenes: calculates all the primes
   in the first 8190 integers. *)

(* Turn off all error checking *)
(*$R-*)
(*$S-*)
(*$T-*)

FROM InOut IMPORT WriteLn, WriteInt, WriteString,
                  Write;

CONST   Size = 8190;
VAR     Flags: ARRAY [0..Size] OF BOOLEAN;
        i, prime, k, count, iter: CARDINAL;

BEGIN
  WriteString("10 iterations");
  WriteLn;
  FOR iter := 1 TO 10 DO
    count := 0;
    FOR i := 0 TO Size DO
      Flags[i] := TRUE;
    END;
    FOR i := 0 TO Size DO
      IF Flags[i] THEN
        prime := i * 2 + 3;
        k := i + prime;
        WHILE k <= Size DO
          Flags[k] := FALSE;
          INC(k, prime);
        END;
        INC(count);
      END;
    END;
    Write(".");
  END;
  WriteLn;
  WriteInt(count, 6);
  WriteString(" primes");
END Sieve.
```

MacModula-2 version of the Sieve is shown in Listing 3.

	Compile	Link	Execute
Microsoft Basic	n/a	n/a	22min 15sec
MacModula-2	53sec	22sec	1min 16sec
MacForth	n/a	n/a	21sec
MacC	44sec	51sec	11sec

I also compiled, linked, and executed the Sieve program on a 512K Mac with no difference in times. From these figures, I would say that while MacModula-2 does not have the speed of a native compiler, for many applications its performance is more than adequate. An application that heavily uses the Mac ROM routines will run faster because that code is not interpreted.

Conclusions

For a low-cost programming language, MacModula-2 is a super deal. I like the Modula-2 language. It is easy to use and reads better than some languages, such as C. Pascal programmers should have no problem picking up Modula-2, as it is derived from Pascal. The manual is well written and thorough. The only thing that could make this an even better product would be for the compiler to generate native code.

MacinTips

A Black Box

Ken Watters

I'M SURE I'm not the only one. There must be somebody else out there as crazy as I am. What I'm trying to say is, there must be somebody else out there with (at least) two Apples, one a Macintosh and one a Two (and a one and a two and a one-two-three . . .). OK, all you people who have both an Apple II ftype and a Mac hold up your hands—one, two, three . . . here we go again!

Well, if you have both machines but not unlimited funds, you might find yourself, like me, with but one printer and one modem between them. If you are lucky, the printer and modem will be compatible with both, like the Imagewriter and Apple modem. OK so far? If you have found yourself plugging and unplugging to be able to use these peripherals with both machines, read on. If you have found a better way, then you are way ahead of me!

What I set out to do was to build a simple switchbox for something less than the $150 commercially available versions that would let me switch back and forth between my Macintosh and *//e* to use both the modem and printer. While I was at it, I also wanted to be able to switch serial data lines together for the two machines, so that I could transfer files without plugging and unplugging. The job turned out to be relatively simple and inexpensive and can be done with Radio Shack parts and some soldering. If you have never tried to solder anything, this might be sufficient motivation to start, as what you will save on this project will buy you a very fancy soldering iron and then some. You may wish to consult the reference manuals for both the modem and printer to see what the "pinouts" are—in other words, what goes where. I have simply referenced everything here by pin number.

This description assumes that you have the same setup as I do—an Apple *//e* with two Apple Super Serial cards and an Imagewriter and Apple Modem. I am sure that this idea can be adapted to most any setup as long as the modem and printer are compatible with both machines.

First, go buy the parts. Here's the list:

NO.	DESCRIPTION	RADIO SHACK	PRICE EA.
1 ea.	Experimenter Box	270-627	$2.39
2 ea.	DB-9 Female Connector	276-1538	$2.49
2 ea.	DB-25 Female Connector	276-1548	$3.99
1 ea.	DB-9 Male Connector	276-1537	$1.99
1 ea.	Hood for above	276-1539	$1.99
1 ea.	DB-25 Male Connector	276-1547	$2.99
1 ea.	Hood for above	276-1549	$1.99
2 ea.	3PDT Switch	275-661	$3.39
1 ea.	DPDT Switch	275-663	$2.79

Total price for all parts is $33.88. If you know of electronics surplus stores in your area, you may be able to do better. The only other thing you need that is not on the list is some eight (or more) multicolored conductor cable. Ten feet or so will do nicely. A surplus store may be a likely source for this.

Using a nibbling tool or small saber saw and drill, cut out the aluminum panel on the experimenter box so it looks something like Figure 1, and mount the parts on it. You will need some #4 hardware for the connectors. If you want to do it right, try to find the kind of bolt that has the hex nut built in to the head, so that when you plug into the connector you can screw the plug down. This is a computer item that you might be able to find at a repair shop, or again at a surplus store.

Wire it according to Figure 2. I know it looks like an electrician's nightmare, but look at the logic of it before you start hooking things up. The big connectors (25 pin) are just for

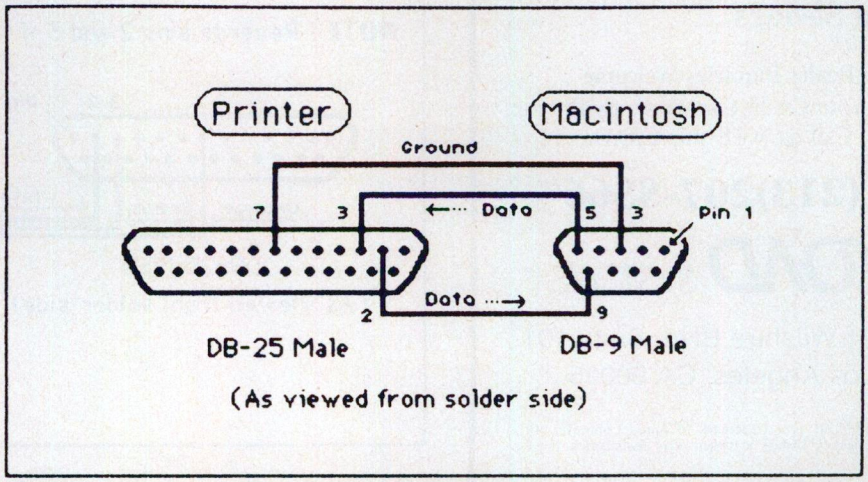

Fig. 1 Macintosh - Imagewriter cable

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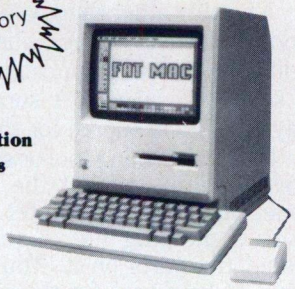

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the printer, and the smaller ones for the modem. The male connectors go on the other end of the eight-wire cables. Be very careful to observe the correct pinouts, as shown in Figs. 2 & 3. For example, you will be taking a wire from pin 2 of the male DB-25 connector (which plugs into the printer) and soldering it to the printer switch, and from there to pin 2 of the two female connectors. A wire which doesn't go through the switch is simply connected to its respective pin on the male connector and to both pins on the female connector in the box. You are simply making an extension cord, albeit a somewhat complicated one. Do not cut off the unused wires in the cable until you try things out. When everything works, then cut off excess wire and close up the box. Be sure to put the hoods on the two male connectors. An elegant "final touch" is to label the switches with some rub-on lettering.

When you try out the printer, make sure to print a graphic on both machines (a MacPaint document on the Mac and a graphics dump on the II,

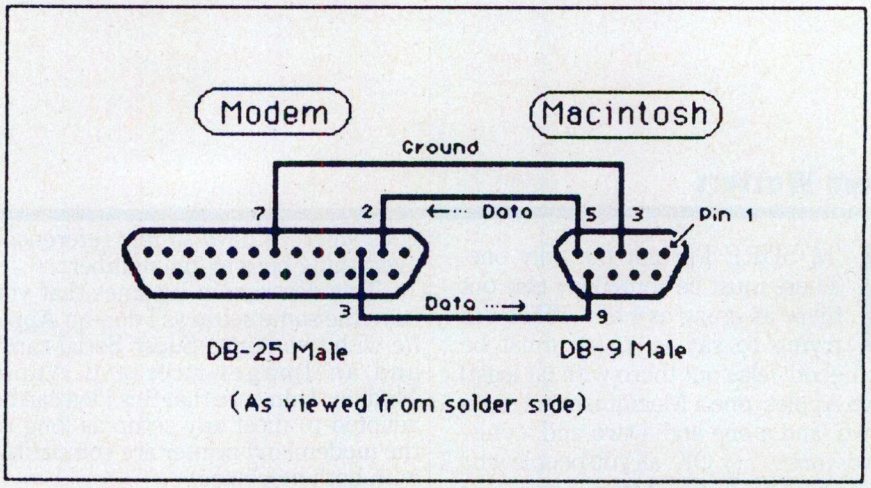


Fig. 2 Standard Macintosh - Modem cable

for example). I found that with the "crosstalk" switch closed, (in porting mode) the modem had to be on in order for things to work. I don't know why this is, but it works, so I'm not going to dig much further! Use any terminal program on the Mac; AE PRO in continuous carrier mode does well on the II. I would recommend only closing the porting switch when actual data transfer is to be done. This will avoid any possible interference. Baud rates up to 9600 can be used with direct transfers.

I hope you will find this box to be an invaluable aid to your computers, as I have. The only place where Murphy's Law applies is that the switch is always in the wrong place when you want to use the printer! Again, labeling would help. I find I really enjoy the ability to log on to CompuServe with either machine, download software for both machines, and then transfer as needed. In fact, having written this on the Macintosh, I am going to put it on a 5¼" floppy on the II, then print it. Just like one, two, three!

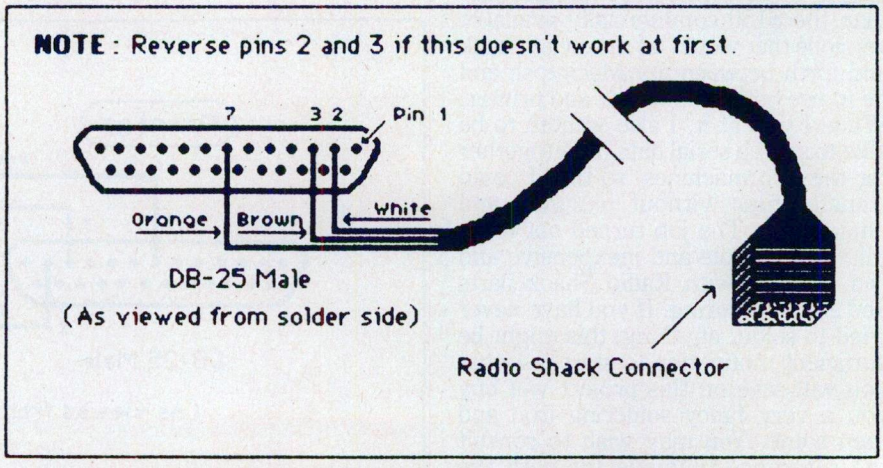
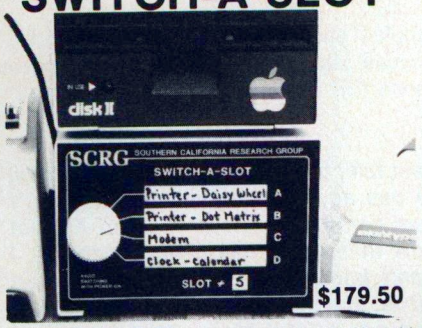


Fig. 3 Connections for Mac-Apple II cable

SCRG PRODUCTS FOR THE APPLE COMPUTER

SWITCH-A-SLOT



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Paddle-Adapple

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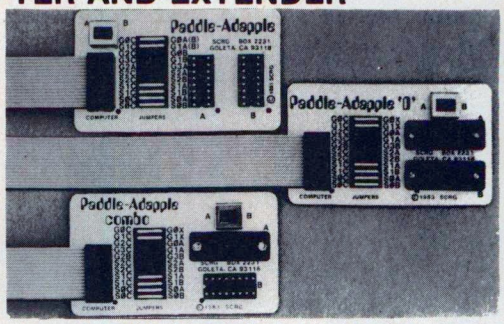

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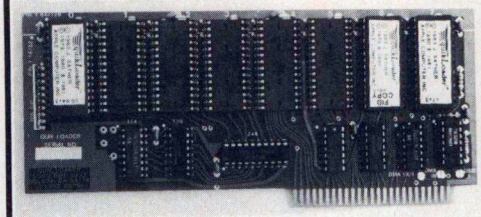
quikLoader™



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The quikLoader is the *fastest* way to load programs. **BAR NONE!** Programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog in either direction.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

PROGRAMMING EPROMS

Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer such as the **PROmGRAMER.** For APPLESOFT, INTEGER, or single machine language files, no programming knowledge is necessary. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

If you have a program that is valuable, it will become **more** valuable when it is instantly available to you. We are actively seeking licenses from software publishers to allow their popular programs to be made available for the quikLoader. Independent authors are encouraged to write programs suitable for the quikLoader. If the author wishes, we will market the program (with appropiate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

We start your library of programs with the most popular utilities on the card, FID and COPYA. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

We are currently licensed to sell several very popular programs on EPROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for DOUBLE—TAKE is $45.00. This includes the program exactly the same as you would buy it at your dealer for $34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about $25.00). COPY][PLUS cost $65.00. This includes the original program (worth $39.95) and **two** programmed 27128's.

Other programs available directly from us or the publishers are, **BARKOVITCH I/O TRACER AND SINGLE STEP TRACE, MICRO/TYPOGRAPHER** from **TIDBIT SOFTWARE, ECHO** speech synthesizer software from **STREET ELECTRONICS,** and **MERLIN** assembler, from **ROGER WAGNER PUBLISHING.** More commercial programs are now in the works.

MEMORY CAPACITY

The quikLoader has eight sockets for EPROMs. These sockets can accommodate standard EPROMs from 2716 to 27512. These types can be freely intermixed. The memory capacity of the quikLoader depends on the EPROMS used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive,but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the quikLoader becomes a 64K ROM. Using larger capacity EPROMs allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the quikLoader operating system supports multiple quikLoaders.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ABOUT THE DESIGNER

The quikLoader was designed by Jim Sather, author of UNDERSTANDING THE APPLE][(forward by Steve Wozniak), published by QUALITY SOFTWARE (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

SYSTEM REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

DOS, INTEGER BASIC, FID, and COPYA are copyrighted programs of APPLE COMPUTER, INC. licensed to Southern California Research Group to distribute for use only in combination with quikLoader.

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The **PROmGRAMER** will read or program any of the standard single-volt EPROMS from the 2708 to the 27512. Features include:

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Circle 23 on Reader Service Card

Something Over 32 Bits

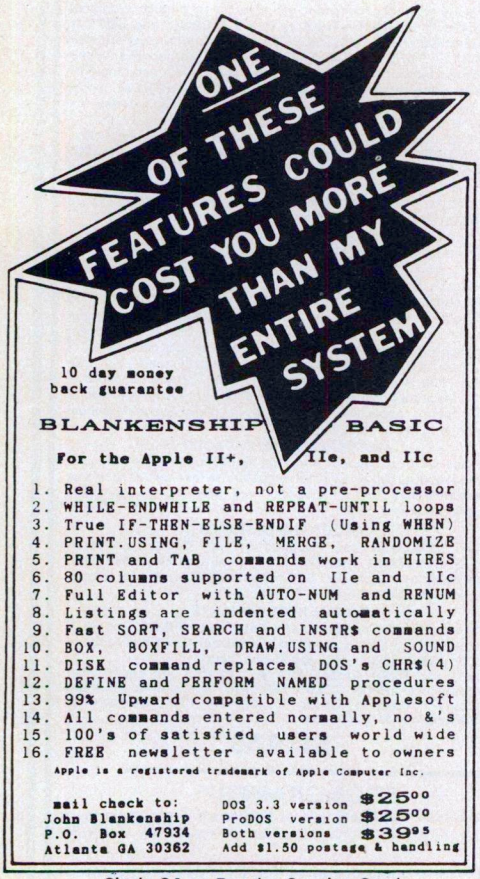
Questions & Answers About Apple's Lisa and Macintosh 32-bit Computers

Dave Redhed

Did Apple make the Switcher available on CompuServe? Has it worked out well?

I have not seen any official response from Apple, but I did see that they received over 300 responses in the way of bug reports and the like. This certainly should encourage them to use this as a way of obtaining a lot of test sites in a hurry.

Apple also put several Switcher–related documents on CompuServe; they can be down loaded and read with MacWrite.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Circle 24 on Reader Service Card

I thought that the Macintosh XL would be around until Apple released a truly Macintosh compatible system with hard-disk, large screen, etc., and now I see that they have canceled the XL. What gives?

There are several explanations going around, but the common denominator between them is that Apple underestimated the sales of the XL. The production line was shut down some time ago under the assumption that the existing backlog of computers would last until the next Macintosh model could be announced. Unfortunately (I use this word in a somewhat warped sense) the XL sales have been much higher than expected and one day they looked in the closet and found far fewer XLs than required to last until the next announcement for Macintosh.

Their choice was to start the production line again, or announce that they "..will discontinue production of the Macintosh XL personal computer this summer..." (i.e. when they run out of inventory). I have also heard that the XLs are relatively expensive to manufacture because of lack of automation in the manufacturing facilities. One person even went so far as to say that Apple was losing money on each XL they sold!! At least this ends the speculation about a new ROM for the XL that would boot the Mac operating system.

While we are on the subject of the XL and its replacement, I might as well pass on the latest rumors I have heard about the next Mac, sometimes referred to as the "TurboMac." It will reportedly use the new 68020 processor, have up to 2 megabytes of memory, and support an optional 20–megabyte hard disk. In stark contrast to the current Mac it is supposed to support several different sized monitors (as big as 8 ½" X 11") and have (would you believe this) an Apple II emulation mode. What more could anyone ask? (Maybe for a Lisa emulation mode?????)

Last fall I bought a Lisa 2 (½ megabyte) to use as a large screen Macintosh. I was going to upgrade it to an XL, but now that Apple has canceled the XL I don't know if that would be a smart move. Maybe I should dump the Lisa 2 and get a 512K Mac with a hard disk. What do you think?

That all depends on what is most important to you — money, expandability, or Mac compatibility. Presumably you bought the Lisa 2 because of the larger screen and/or its expandability characteristics and did not care about Mac compatibility (i.e. no sound & screen distortion). If, at this point in time, the prospect of a 1–megabyte memory is not of much importance to you, and you can get your money out of the Lisa 2, there is little money difference in your two choices. If you cannot get your money out of the Lisa 2, then your two cheapest paths are to wait until the new Mac is available or upgrade the Lisa 2.

The biggest factor is related to Mac compatibility. Most people would like to have a system on which they can run any Mac software and have it behave as advertised (or at least as it behaves on other Macs). The XL route is obviously there for people who do not need sound and want the extra memory and screen size.

I was told that most of Apple's development for Mac was done under the Lisa Workshop running on either the Lisa or the XL. Now that the XL has been killed, what will developers do?

Apple says that they will continue to support the hardware with maintenance and spare parts. As for the prospect of additional computers, I have to assume that Apple believes they have saturated the developer market with XLs — at least enough to last until they make available a replacement development system on some model of a Macintosh.

No other micro has a development system that compares with the Lisa Workshop, so I do not think that they will give it up readily. However, converting it to the Mac will be a problem until a multi–tasking operating system runs on the Mac. One of the nicest features of the Workshop is its ability to keep several things memory resident. With a 2–megabyte system, you can have the editor, compiler, linker, and a sizable application all resident at the same time. Possibly the Mac Switcher could do this also (without multi–tasking) when the Mac gets more memory.

A.P.P.L.E. Doctor

Bruce F. Field

ROOM FOR APPLEWORKS

Q. *I would like to be able to use AppleWorks on my IIe which has 64K, DOS 3.3. One salesman claimed that I don't need to make any changes, that I can use AppleWorks on my Apple as is, although I won't have much memory for data. What modifications or memory expansions would you suggest?*

A. Your salesman is right, AppleWorks works fine on a standard *II*e. However, with only 64K of memory you will only have about 10K left for data after loading AppleWorks. For any serious work you will want to get the extended 80–column card that includes an additional 64K of memory. With the extended 80–column card AppleWorks has about 55K of memory left for data. Applied Engineering (see their ads in *Call –A.P.P.L.E.*) sells a Ramworks card that can hold up to 1 megabyte of memory, leaving 800K left for data. For most household uses I think that only the extra 64K is required.

AppleWorks runs under the ProDOS operating system, and this comes on the AppleWorks diskette. You just boot this like you would any ordinary DOS 3.3 diskette and use the program. The only problem comes if you want to copy an AppleWorks file to another disk or make a backup copy of the AppleWorks program. For this you will want the ProDOS Filer program. If you buy the ProDOS Users diskette and manual from your dealer this will have a copy of the Filer program and instructions on how to use it.

PRINTER I.D.

Q. *Is there an agreement in the industry which makes it possible for a program to detect what make of printer is being used? Two programs which I have seem to indicate so. One says, ". . . If a compatible printer is not detected, an error message will be displayed . . . ." The second program listing says, ID = PEEK (49633) and indicates different ID's for different printers. By what procedure, and when, does the printer cause the right number to be POKEd into 49663?*

A. You are understandably confused because, regardless what these programs say or imply, there is no way to tell what printer is connected to the Apple. Within reason it is possible to tell what kind of printer *interface* card is plugged into the Apple and from that you could draw some conclusions as to what type of printer is being used. Most printer interface cards for the Apple have a small memory that contains a machine language program telling the interface card how to work to print a character. This program, or a part of it, can be read by the Apple as the command ID=PEEK(49663) does. This reads the last byte in the memory on the card in slot 1. If you know what the last byte in the program of each possible printer interface card is, you can tell what card is in the Apple.

If you need real proof that you can't tell, look at the electrical specifications for parallel printer interfaces (a lot, if not most, printers are connected using a parallel Centronics–type interface). This interface allows data to flow only from the computer to the printer, the printer may send back signals to indicate only if the printer is selected, paper is out, or if the printer is busy. There is no provision to send any data back to the computer to identify the type of printer.

APPLEWORKS LINE NUMBERS

Q. *When using the AppleWorks word processor, I like to enter my own page breaks. This works well with the new page command, however, after I put in the first page break, I then want the next page to begin with LINE 1. It doesn't. The line numbers are listed cumulatively. This is not good at all in telling me what line I am on the current page. What am I doing wrong?*

A. You are not doing anything wrong, AppleWorks simply numbers lines from the beginning of the document and ignores page breaks. There is nothing you can do about it.

TRANS–PORTING APPLESOFT PROGRAMS

Q. *I am interested in transferring Applesoft programs to other machines and to other Apple II users via modem. Is there any existing software to convert Applesoft files into text files for this purpose?*

A. A number of communication programs will transfer Applesoft files directly from one Apple to another. If you are going from Apple to Apple this is preferable because

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fewer characters have to be transmitted. However if you want to, it is really easy to convert Applesoft to text files. The old DOS 3.3 manual contains a short program that can be appended to the beginning or end of an Applesoft program and will save it to disk as a text file. I will repeat it here.

```
1 REM CAPTURE
2 D = CHR$(4): REM CTRL-D
3 PRINT D$;"OPEN LISTING"
4 PRINT D$;"WRITE LISTING"
5 POKE 33,30
6 LIST 10-
7 PRINT D$;"CLOSE LISTING"
8 TEXT : END
```

As the program is listed above, the Applesoft program you want to convert should not have any lines numbered below 10. Load your Applesoft program in, type in the listing above, and run it. This will create a text file with the name LISTING and list all the program lines starting with line 10. The POKE 33,30 prevents Applesoft from including extra spaces in the listing.

HELLO DATES

Q. *I've written three Applesoft programs that are associated. The first "HELLO" program is loaded when the disk is booted. It has a menu which takes me to either of the other programs that I select. The "HELLO" asks for today's date to be inserted. Is there any way to transfer the date to the other programs when they are selected without having to reenter it?*

A. There are two ways to do this. One, you can have your HELLO program POKE the date in some protected area of memory that is not destroyed when you load your second and third programs in. Then the later programs can peek at the memory locations to determine the date. Alternatively you could have your HELLO program write a small text or binary file to disk which contains the date. Writing the date to the disk has the advantage that you can always tell on what date you last updated you data. Of course in this case you need to keep the same disk in the drive for all three programs. An example of each way is shown below.

Using POKES and PEEKS:

In your HELLO program–

```
5000 REM ASSUME THE DATE IS IN
     VARIABLES MO, DA, AND YR (I.E.
     YR = 84)
5010 POKE 973,MO : POKE 974,DA :
     POKE 975,YR
```

To recover the date in later programs–

```
1234 MO = PEEK(973) : DA = PEEK(974)
     : YR = PEEK(975)
```

These memory locations are in page 3 and are usually not disturbed unless you load in a machine language program in page 3. Then you will need to check if there is a conflict between these memory locations and the ones used by the machine language program. Page 3 is also altered if you re–boot your system. If you want to write a disk file, one way is shown below.

To store the date from your HELLO program–

```
2000 REM ASSUME DATE IS MO, DA,
     YR
2010 PRINT CHR$(4)"OPEN
     TODAYSDATE"
2020 PRINT CHR$(4)"WRITE
     TODAYSDATE"
2030 PRINT MO,DA,YR
2040 PRINT CHR$(4)"CLOSE
     TODAYSDATE"
```

To read the date back–

```
3000 PRINT CHR$(4)"OPEN
     TODAYSDATE"
3010 PRINT CHR$(4)"READ
     TODAYSDATE"
3020 INPUT MO,DA,YR
3030 PRINT CHR$(4)"CLOSE
     TODAYSDATE"
```

APPLEWORKS FOR THE APPLE][+

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DOUBLE DUTY DRIVES

Q. *I want my Applesoft program to make a backup copy of a data file on a backup disk in drive 2. What do I say in my program to get this file from D1 to D2? I have no problem saving my program on either disk drive, but I can't save the data file on D2 the same as I do the program.*

A. There is no Applesoft or DOS command to copy a text file from one drive to another. What you will need to do is modify your Applesoft program so that it first writes your data file to drive 1 and then writes an exact copy to drive 2. This is actually not too difficult. Structure your program so that the part of your program that prints to the disk is in a subroutine. Do all your calculations and whatever in the main program and save all the results in variables. Then the subroutine only takes the variables and prints them to disk. If you want to be really clever, save the drive designation (D1 or D2) in a string and set the string appropriately before calling the subroutine. Here's what I mean.

```
1000 REM ALL YOUR CALCULATIONS
     GO HERE
1010 DR$=CHR$(6)"D1" : REM FIRST WRITE
     TO D1
1020 GOSUB 2000 : REM GO DO IT
1030 DR$ = "D2" : REM NOW THE
     SAME TO D2
1040 GOSUB 2000
```

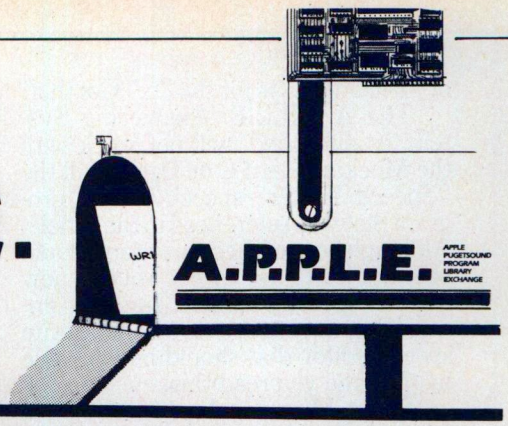
BOOTING FROM DRIVE 2

Q. *I would like to know of a method to boot a protected game diskette from drive 2 after I have booted the DOS from drive 1. I use a 3.5" type disk drive as drive 1 and a 5" type disk drive as drive 2.*

A. When the Apple "boots" DOS, it runs a small machine language program stored in a ROM (read–only–memory) on the disk interface card. The instructions in this permanent memory tell the Apple what drive to use as the boot drive. If you are adept at machine language, you could copy this program into RAM and modify it to run at the new memory address and to use drive 2 as the boot drive. This is not a simple process.

Another way is to modify your disk interface card by adding a switch to control which disk drive is connected as drive 1. This is not as difficult as it first sounds; all but one of the wires to the drives are connected in parallel and go to both drives. Only one wire for each drive has to be switched. The traces going to pin 14 of each of the drives should be cut and a double–pole double–throw switch added that connects the pin 14s from each of the drives to either the trace that originally went to that pin 14 or to the trace for the other drive.

Write—A.P.P.L.E.



Readers' forum

IMPROVING VIDEO OUTPUT

Q. *I have an Apple II+ with the Sanyo monochrome B&W 13" monitor. How can I improve my screen resolution? Do you know of any plug-in cards for this purpose? Or better monitors?*

Princeton makes a nice hi-res monochrome amber monitor, 12" with 800 x 350 resolution, but this doesn't work with the Apple.

A. There are two parts to the problem here. The video circuits inside the Apple control the resolution or number of dots displayed on the screen. For normal Apple video with 40 characters per line and 5 dots per character plus two spaces per character there are a total of 280 dots on each line of text. There is no way to change this without buying an 80-column card. All 80-column cards are not the same; some use a different number of dots to create the characters. Generally the greater the number of dots, the better the character looks. The Videx Ultraterm has very high resolution but it uses it to put more characters on the screen 160 x 48 (characters not dots) rather than making the characters look significantly better.

The second thing to consider is the resolution of the monitor. The monitor resolution is a measure of how many dots *can* be displayed on the screen, not how many will be or must be. If the monitor has insufficient resolution the characters become blurred and hard to read (i.e. like using a color TV). There is little advantage in using a monitor that has a resolution much better than the video output. The characters might be a little sharper but they won't contain any more dots.

Color monitors are a different story entirely. There are two types of monitors, RGB and composite. The RGB monitor has three separate inputs, one for each of the colors red, green, and blue. The composite monitor on the other hand accepts one input that has all the three signals combined together. The combining process limits the resolution of the signals to about what the 40-column Apple produces. (A color TV uses a composite signal which is one reason you can't display 80-column text successfully with a color TV.) To produce more than 40 columns of text with your Apple and still have color capability, you will need a special 80-column card, one that produces RGB outputs, and an (expensive) RGB monitor.

Mockingboard Speech Update

The A.P.P.L.E. Answering System ("Call Your Apple," *Call -A.P.P.L.E.* Sept. 84) was designed for the original Mockingboard Speech I or Sound/Speech I. As I mentioned in my letter that appeared in January 1985, Sweet Micro Systems no longer produces nor supports those original products. However, they *will* send the "4050" chip to owners of "4049" chips upon request. Just call them at (401) 461-0530. If the person you reach doesn't seem to know about this, tell them to check it out with Mr. Fred Graswald. But please don't bother Mr. Graswald unless necessary.

Sweet Micro's current speech board for the Apple II+ and *//e* is the Mockingboard C. This peripheral combines stereo sound effects and musical capability with a greatly improved speech synthesizer. You can hear a sample of it by calling (401) 941-1130. The sound and music features are fully compatible with software written for the old cards, but the new speech synthesizer won't work with the old software.

A serially-driven version, the Mockingboard D, is designed to be used with the Apple *//c*. Don't confuse the "C" in "Mockingboard C" with the "c" in "Apple *//c*." "C" is for the "+"

```
1                [change 24448 to 32768]
50               PRINT D$; "BLOADCOMPOSITE DRIVER IIE"
51               POKE 255,0:POKE -16293,0:POKE -16291,0
95               B = N:GOSUB 6000:NN = N
155              IN% = PEEK (-16384):IF IN% > 127 THEN
                 W = 1300:NEXT:GOTO1000:REM Exit cleanly
205              IF R = 1 THEN GOSUB 7000: REM Select appropriate message
210              [change N to NN]
230              GOSUB 1120
1020             IF IN% = 196 THEN GOSUB 7000:GOTO 245:REM D = Demo
1030             IF IN% = 208 THEN 6100: REM P = printer toggle
1100             [change 1120 to 1116]
1111             PRINT D$;"IN#0":PRINT D$;"PR#0"
1116             RETURN
1120             PRINT D$;"PR#";P
1125             IF P THEN PRINT CHR$(9);"K":REM Optional, as with original
1340             [change 3*(M = 2) + LY to (3-LY)*(M = 2)]
DEL 2210,2230 [delete all old lines in this range]
2210             CALL 27904:REM Speak
2240             IF PEEK(255) > 0 THEN 2240
DEL 4000,4110 [delete all old lines in this range]
4000             MO = 24576
4010             PRINT D$;"BLOADMORNING,A";MO
4020             NO = MO + PEEK(43616) + 256*PEEK(43617)
4030             PRINT D$;"BLOADNOON,A";NO
4040             EV = NO + PEEK(43616) + 256*PEEK(43617)
4050             PRINT D$;"BLOADEVENING,A";EV
4060             NI = EV + PEEK(43616) + 256*PEEK(43617)
4070             PRINT D$;"BLOADNIGHT,A";NI
5025             B = 1:GOSUB 6000
6000             FOR X = 1 TO B:CALL -1052:NEXT X:RETURN:REM Ring bell B
                 times
6100             P = NOT P:GOTO 90:REM Toggle printer
7000             GOSUB 1100:REM Read clock
7010             IF NOT PM AND T > 559 AND T < 1200 THEN SS = MO:NN = N
7020             IF PM AND (T > 1159 OR T < 600) THEN SS = NO:NN = N
7030             IF PM AND T > 559 AND T < 1200 THEN SS = EV:NN = N
7040             IF NOT PM AND (T > 1159 OR T < 600) THEN SS = NI:NN = 1:REM
                 Limit to 1 ring after midnight
7050             POKE 250,SS/256:POKE 249,SS-(256*PEEK(250)):REM Point driver
                 to desired message
7090             RETURN
```

or "e" and "D" is for the "c." Got that?

The A.P.P.L.E. Answering System, as published, will not work with the Mockingboard C or D; nor will the "Speech Writer" speech editing program that was referenced in the article. Although both of these programs could be modified to use Sweet Micro's new text-to-speech routines, I am recommending instead a more versatile speech editor that should be available by the time you read this.

Sweet Micro is about to release a "Speech Development System" (SDS) for the Mockingboard C and D. Having experimented with a pre-release version of SDS, I am confident that, given sufficient time and experience, it is possible to create speech that closely approaches the quality of a dictionary-based system and retains the unlimited vocabulary of a phoneme-based system. SDS creates an initial phoneme table using an improved text-to-speech algorithm that was fine-tuned by a professional speech therapist. It then allows you to refine each sound by adjusting its pitch, amplitude, filter frequency, articulation rate, rate of pitch transition, and rate of amplitude transition. You can also add, delete, or replace phonemes. The graphic display shows you the relative settings of the selected parameter for several sequential phonemes at once. I would encourage everyone who owns a Mockingboard C or D to see a dealer about getting SDS. And, I would encourage anyone who doesn't yet have a Mockingboard C or D to give it a listen.

I have modified my copy of the Answering System to drive the Mockingboard C using phoneme tables generated by SDS. For those who have the original program and want to upgrade it to the new hardware, here are the changes. These changes also add new features such as printer select/deselect, audible feedback of ring count, and a demo mode.

Yours truly,

Clay Ruth

Passing Through Pascal

I am a high school senior working on the Apple Pascal System. I have found some interesting information about maneuvering through the system and saving programs.

Concerning maneuvering through the system, I have found a list of commands that will quit the editor, clear the workfile, and return to the editor. The sequence is Q E F N Y Q E . This sequence is part of the book, *Apple Pascal—A Hands-on Approach*, written by Arthur Luehrmann and Herbert Peckham. Through my personal experiences, I have found that adding "(CR) I" to the sequence will put the user into the input mode after clearing out the old workfile. To me, this seemed more useful than the sequence originally published. I thought that other users would gain by the added features to the original sequence.

Concerning saving a program, I have found that in the Save mode, it is only necessary to type in the program name in response to the prompt "Save as what File?." The system adds the necessary .TEXT to the text file and .CODE to the code file. I believe that this shortcut in typing the name of the program to be saved would benefit other users.

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SURVEY

What one computer do you currently use most?

A ☐ *Apple II*
B ☐ *None*
C ☐ *Apple IIe*
D ☐ *Other (specify)*

What hardware product are you most likely to buy in the next 4 months?

E ☐ *Hard Disk*
F ☐ *5 megabyte*
G ☐ *10 megabyte*
H ☐ *20 megabyte*
I ☐ *8086 board for your Apple (run IBM P/C software)*
J ☐ *Apple keyboard (increase capability)*

What computer language would you likely purchase in the near future?

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The Marketplace

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kyan pascal FOR THE APPLE *II*

Kyan Software has introduced a new Pascal compiler for the Apple *II* family of computers. kyan pascal is designed for both students and advanced programmers. It is a full Jensen/Wirth implementation and features a full screen text editor and graphics support. The compiler generates optimized 6502 machine code which runs faster than Turbo or Apple Pascal and more than 30 times faster than Basic. It features the most frequently requested extensions to standard Pascal (string handling, chain, include file, random access files, etc.) and a built-in assembler (which lets programmers add in-line or included assembly source code and provides total control of the operating system and hardware). kyan pascal comes complete with ProDOS operating system, tutorial manual, and Pascal reference guide.

kyan pascal requires only one disk drive and 64K of memory. It is available on a non copy-protected diskette for $69.95 and comes with a 15 day money back guarantee.

For more information contact: *kyan software 1850 Union Street #183, San Francisco, CA 94123, (415) 775-2923*

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PRO-DOS TELECOMMUNICATIONS SOFTWARE FOR THE APPLE

ASCII EXPRESS "The Professional" ProDOS, a new updated telecommunications software package that will run exclusively under Apple Computer's new ProDOS operating system, is available from United Software Industries, Inc.

ASCII EXPRESS ProDOS is compatible with all of todays popular modems plus direct connect applications. It allows users to dial-up any of the public information databases such as CompuServe or The Source or to communicate with other computers.

ASCII EXPRESS ProDOS supports popular hardware for the Apple such as internal and external modems; display devices such as Apple's 40 column screen and 80-column boards and external terminals.

ASCII EXPRESS ProDOS contains more advanced features than any other Apple communications program available today including on-line help menus and descriptions at a single command; support for baud rates up to 9600; error-free protocol transfers of files of any type or size to compatible programs; macros; unattended (remote) operations; data buffer; and a user-friendly install program to customize ASCII EXPRESS ProDOS to perform many of the above features automatically at run time. Retail price: $129.95

For further information contact *United Software Industries, Inc., 1880 Century Park East, Suite 311, Los Angeles, CA 90067* (213) 556-2211.

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THE FUTURE IS NOW

Time-Trax Version 2.0: This is the most current version of your old friend Time-Trax. You will find it essentially the same as Version 1.44. We have changed the main menu a bit and have added the ability to use "word processing" type commands in the editing functions (i.e. such as add a line, delete a character, etc.). In addition, on the back side of the program disk there is a very nice, Time-Trax style, automated program for installation of the ProDOS patch routine onto ProDOS program disks (this alone is worth the money) and there is a program called CAT.CLOCK for Catalyst users. *Word of Caution:* Version 2.0 is not compatible with data disks made under other versions of Time-Trax (sorry about that). For registered warranty card holders the cost of Version 2.0 is $15.00.

Time-Trax SEIKO Wrist Terminal Version: Hattori Corporation of America, the marketing arm of Seiko (the watch people) have licensed a modified version of Time-Trax. This new version will do all the things that the other versions have done, but in addition download data from an Apple *II* series computer to a Seiko wrist Terminal (watch). To load the Seiko wrist terminal, you simply lay the watch on the interface box (included) and press return. There are no wires or plugs, data is transferred by an induction couple. The Seiko wrist terminal will then notify you and display events on its six line by ten character display at the proper time. The Seiko wrist terminal is also a full function watch and is about the same size as an ordinary digital watch.

The suggested retail price for the Seiko package, which includes Time-Trax Version 2.0, the clock/interface and the Seiko wrist terminal is $199 and for registered warranty card holders it is $149.95. *Creative Peripherals Unlimited, Inc., 22952 Alcalde Drive #160, Laguna Hills, CA 92653, (714) 770-3334.*

Circle 45 on Reader Service Card

CUSTOM TUTORIALS

Publishers of software for Apple II computers can now have custom-made demonstration or tutorial disks of their software in as little as two weeks. Parrot Technologies of Chicago, Illinois is now providing this unique service.

A "digital videotape machine" creates a demonstration and tutorial disks of microcomputer software. A patent is pending on the device, which records the video output of any microcomputer software onto a regular floppy disk. The software can be text-oriented, or it can include dynamic, high resolution graphics.

Using the machine, Parrot technologies can produce these disks without doing any programming. The old expense involved in developing demo disks can now be done faster, and for much less money. A wide range of special effects is also possible. In addition, there is no risk of software piracy, because the client's software is not present in any form on the demo disk. Once a demonstration disk is created, the publisher owns it and can make as many additional copies as desired, without additional charges. *Parrot Technologies, 1525 E. 53rd St., Suite 516-4, Chicago, IL 60615, (312) 493-7098*

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ANCHOR SIGNALMAN MK12 MODEM	399.00	251.00
NOVATION APPLE CAT II MODEM	319.00	198.00
PCPI 6MHz APPLI-CARD (Z80 CP/M) (BEST Z-80 CARD FOR THE //E	375.00	263.00
MICROSOFT Z-80 SOFTCARD CP/M	345.00	219.00
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VIDEX ULTRATERM	379.00	225.00
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A5 HALF-HEIGHT APPLE COMPATIBLE	310.00	205.00
A5 DRIVE WITH CONTROLLER	410.00	259.00
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SCREEN WRITER PRO (ON-LINE)	129.00	79.00
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ACSII EXPRESS PROFESSIONAL	129.00	79.00
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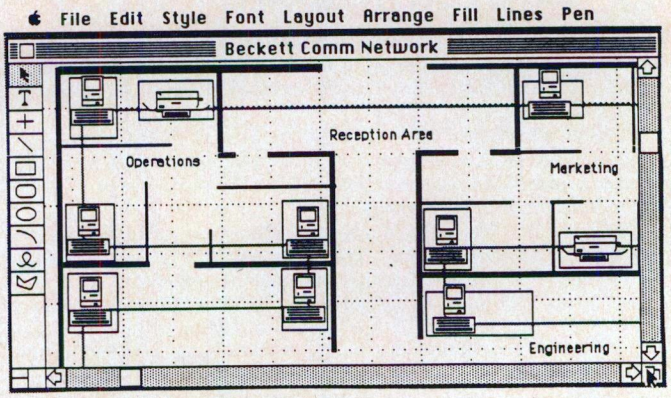
Macintosh New Products

MACDRAW ARRIVES



Cupertino, CA — Apple Computer is now shipping MacDraw, a structured graphics application for the Macintosh.

Managers can use MacDraw as a tool for creating professional presentation materials to be used in meetings and reports. Engineers, architects, and graphic designers can use MacDraw to create flow charts, technical diagrams, maps, and graphics illustrations. Precision drawing is possible by using a selection of useful graphics shapes that include straight lines, arcs, rectangles, and circles with such measurement aids as rulers, grids, and sizing capabilities. MacDraw also offers text rotation, reduce and reduce-to-fit capabilities, and the ability to rearrange, resize, reshape, or delete objects as needed.

MacDraw is different from "painting" software programs, such as MacPaint, because it emphasizes structured graphics rather than free-hand drawing and artistic graphics. MacDraw's palette of graphic shapes simplifies the creation of illustrations because the graphics are recognized as individual entities that can be combined, modified, or manipulated easily.

For example, MacDraw is ideal for constructing floor plans. Using the mouse, the user can design partitions and furniture easily and accurately and add shading to distinguish objects. If it is an exceptionally large floor plan, the reduce-to-fit feature will allow the entire document to be seen and modified on the screen. Individual objects can be rotated, moved, or deleted to make changes easy. Text can also be added for labels.

MacDraw can create documents as large as eight by ten feet, and can handle up to four open documents at any time. MacDraw can be combined with MacWrite (word processing), MacPaint (free-hand drawing and graphics), MacProject (project management), and other Macintosh applications. In addition, MacDraw can be used with the Apple LaserWriter and ImageWriter printers to produce high-quality graphics illustrations.

MacDraw is available now from authorized Apple dealers. The suggested retail price is $195.

Circle 47 on Reader Service Card

MAC POWER

MAC POWER: Using Macintosh Software, by Allen Munro, introduces readers to the most popular Macintosh software currently available, and gives tips on using each software package productively. It includes many easy-to-follow examples, shortcuts, and a brief guide to MacPascal and Mac peripherals. Readers will learn how to polish their word processing skills with MacWrite and Microsoft Word, create and edit spreadsheets with Multiplan, produce high-quality business graphics with Microsoft's Chart, communicate with other computers using MacTerminal, and more.

Features

- Covers 11 major software packages in depth, focusing on the applications programs that make the Macintosh useful.
- Shows you how to produce your own graphics with MacPaint and MacDraw, create and manipulate outlines with ThinkTank, organize your files with Filevision, and more.
- Includes over 250 illustrations created by the author using the Macintosh.
- Provides a helpful appendix on mouse skills for new users.

Price: $15.95. Publisher: *Scott, Foresman and Company.*

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If you're like most computer users you've probably felt pain or discomfort in your arms, neck and shoulders while using your APPLE® computer for any length of time.

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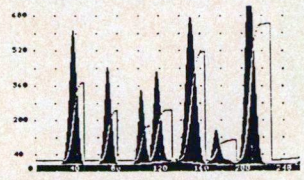

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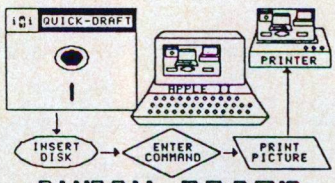

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Macintosh New Products

INTEGRATED SPREADSHEET FOR MACINTOSH

Van Nuys, CA — Haba Systems has announced the shipment of Quartet, a four-part integrated spreadsheet application for Macintosh. Quartet combines spreadsheet, graphics, text editing, and data base capabilities in one application which runs on both 128K or 512K Macintosh systems.

One feature of Quartet is its speed, as information is stored in memory not on disk. Speed has been calculated at up to 10 times faster than other Macintosh spreadsheets. Quartet includes such features as a spreadsheet size of 62 columns by 999 rows, data tables for "what-if?" scenarios, automatic dating of work, and a complete set of formatting options including cell underlining, scaling, and suppress zero. Pie, bar, and line graphs enable users quickly illustrate conclusions and, whenever a value is changed, the new calculations are automatically reflected in the corresponding graph. It is also possible to re-size graphs instantly to fit a particular area of the spreadsheet with the use of the mouse.

Also included in Quartet are text editing and data base capabilities. Using the annotator's word wrap, underlining, and justification features, users can detail spreadsheet entries or graphs and create memos, letters, and other short documents. Data listings for people, businesses, products, or services can be categorized and arranged alphabetically, numerically, or geographically in virtually any manner because Quartet offers dual-level sorting ability.

The product carries a suggested retail or $199.95. *Haba Systems, 15154 Stagg Street, Van Nuys, CA 91406, (818) 989-5822.*

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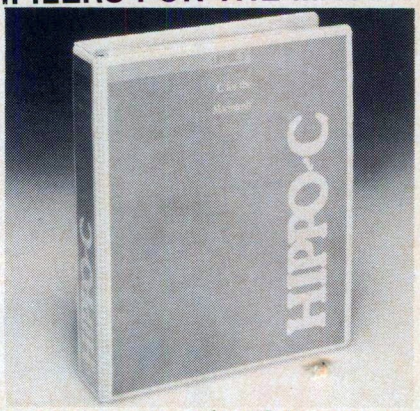
C COMPILERS FOR THE MACINTOSH



Hippopotamus Software, Inc., of Los Gatos, announces the release of Hippo-C Level 2, a full-featured C compiler for the Macintosh.

Hippo-C is available in two versions so that every user's needs can be satisfied. Level 1, designed for use by educational institutions and the general public, enables users to edit, compile, link and execute C programs quickly and easily on a standard 128K, single-drive Macintosh. Incorporating the familiar Macintosh user interface, Hippo-C Level 1 comes with an editor, full C compiler, linker, symbolic debugger, standard C library, on-line tutorial and shell command processor.

Hippo-C Level 1 also allows convenient access to over 450 Macintosh Toolbox and Quickdraw routines, the sound channels, and the serial ports. Level 1, introduced in September 1984, is currently available in retail computer and software stores.

Hippo-C Level 2 contains even more powerful features, making it an ideal environment for professional software development. Level 2 allows for the creation of large, stand-alone, "double-clickable" Macintosh application programs. It features an optimizing C compiler, 68000 assembler, linker, librarian, full floating point support, header files, and a UNIX-like command shell. Level 2 provides access to over 500 Toolbox routines, the sound channels, and the serial ports. Level 2 comes with over 200 pages of useful documentation, many sample C programs, and source code.

Hippo-C Level 1 retails for $149.95, and Level 2 retails for $399.95. An upgrade kit which converts Level 1 to Level 2, is available for $250.00. No licensing fees or royalties are imposed on code generated by either Level 1 or Level 2. Non-copy protected version of either Hippo-C Level 1 or Level 2 are available for an additional $25.00.

Hippo-C is available at computer and software stores, or directly from *Hippopotamus Software, Inc., 985 University Avenue, Suite #12, Los Gatos, CA 95030, (408) 395-3190.* Circle 50 on Reader Service Card

The Latest Compact 3.5″ Hard Disk System from AST Research.

MicroStor™, the Apple IIe™ 10Mbyte Hard Disk System with an optional 10Mbyte Tape Back-up.

MicroStor™, the compact 3.5″ hard disk system is designed for the knowledgeable professional who needs a rugged, high quality, dependable mass storage system at an economical price.

AST, known for setting high standards with enhancement products for personal computers such as the IBM PC™, the Apple IIe™, and the Macintosh XL™, is providing the latest 3.5″ hard disk technology in easy-to-install configurations. The MicroStor system starts with a 10 megabyte hard disk that can be upgraded to include backup support of a 10 megabyte cartridge tape drive.

MicroStor runs 4-6 times faster than floppy drives. It provides safe storage of your valuable data and is 100% compatible with ProDOS™.

For more information about MicroStor's versatility, see your local computer retailer or call AST Research for a dealer near you.

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■ **They're all winners:** Apricorn's Apple upgrades are designed and manufactured for trouble-free performance. All of our cards are totally software and hardware compatible, fully burned-in, tested, and socketed. Our comprehensive, illustrated manuals and Lifetime Warranty give you a winning hand, everytime.

■ **Super Serial Imager™:** This powerful new card replaces Apple's own Super Serial Card as the best RS-232 interface available for Apple // computers. In terminal mode, Imager's powerful built in communications firmware contains interrupt support for trouble free operation at 300-1200 baud and beyond with special support of most intelligent modems. In printer mode, it's a full featured graphics interface. Support provides full screen dumps to Apple Imagewriter printers and most serial interfaced graphics printers. Command compatible with graphics card described below.

■ **Graphics Printer Interface:** A potent graphics output card for parallel printers. Pictures and graphs from the hi-res screen as well as snapshots of the 40/80 column text screen are performed with a simple print command. Contains Grappler + command set as subset for software compatibility.

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The standard memory card for the Apple][and Apple][+ computers. Compatible with the Apple Language Card and the Microsoft RAMCard.
SUPER SERIAL IMAGER:
Apple Super Serial Interface Compatible. Full featured Graphics Interface with powerful built-in communications.

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